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Telephony.

THE AMERICAN TELEPHONE JOURNAL

PUBLISHED EVERY SATURDAY.
TELEPHONY PUBLISHING COMPANY.
VOLUME 71, No. 8.

CHICAGO, AUGUST 19, 1916.

SINGLE COPIES, 10 CENTS
YEARLY, U. S. A., $3; CANADA, $4;
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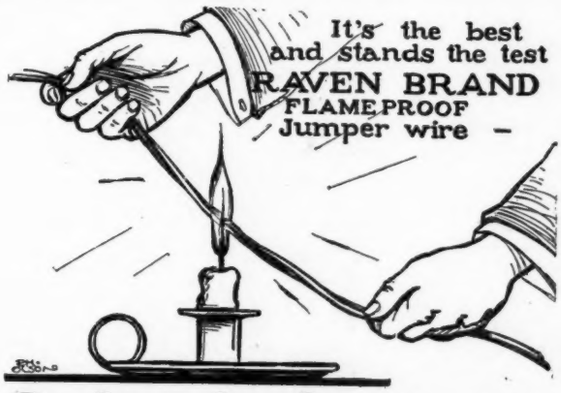

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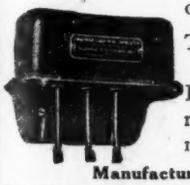

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Telephony.

THE AMERICAN TELEPHONE JOURNAL

Comprising Telephony, American Telephone Journal, Telephone Weekly, Telephone Magazine, Telephone Securities, The Telephone, Sound Waves

PUBLISHED WEEKLY BY THE TELEPHONY PUBLISHING COMPANY
MONADNOCK BLOCK, CHICAGO

H. B. McMEAL, President and Editor. H. D. FARGO, Secretary and Treasurer. J. C. KELSEY, Vice-President and Financial Editor.
S. R. EDWARDS, Managing Editor. J. R. HASTIE, Vice-President and Advertising Manager.

Entered as second-class matter September 4, 1908, at the post office at Chicago, Ill., under act of March 3, 1897

Volume 71
Number 8

CHICAGO, SATURDAY, AUGUST 19, 1916

Subscription—10 Cents a Copy
$3 a Year U. S., Cuba and Mexico
$4 Canada; $5 Other Countries

Bill, the Troubleman, says:

"To fit oneself for better things calls for self-denial and even many seeming sacrifices—but the deserved reward comes in the end. The Bell people will learn this but unless they begin practicing restraint and making sacrifices soon, it will be too late for them to obtain anything but a negative reward."

An Example of Bell Tactics.

Everybody who believes in a square deal can see at a glance what an unfair advantage the combination of the Bell and the Western Electric Co. gives both concerns over their competitors. Read this letter from a small Independent telephone company to an Independent manufacturer:

"I regret to inform you that the ———— Telephone Co. has today purchased a Western Electric switchboard. The price you made and that of the Western were the same, but the directors of the company decided to buy the Western Electric equipment *for the simple reason that by so doing they can get Bell long distance connections without any difficulty, through the assistance of the Western Electric people.*"

This letter is signed by the secretary of the operating company. Both names are omitted for the obvious reason that if they were given, the Bell would certainly make it unpleasant for the man and his company. The Bell doesn't like comment on its strangle-holds. They are effective when used behind closed doors, but somehow they assume an ugly, un-American appearance when laid bare to the public gaze.

Consider this case for a moment: Here is the American Telephone & Telegraph Co., a public service corporation and a common carrier, enjoying all the privileges of such, and at the same time bearing responsibilities and duties to the public it serves. This corporation owns a telephone factory which is in direct competition with Independent manufacturers. A little Independent operating plant in the Middle West is in the market for a switchboard. Both the Bell factory and the Independent manufacturers submit bids. The prices are the same, but because the Bell-Western Electric combine can offer the customer Bell connections *"without any difficulty,"* the Bell factory gets the job.

A more glaring example of the wretchedly unfair competition the Bell interests are waging against Independents could scarcely be imagined. But this case is only typical of many others. The United States government has made the Bell telephone company a common carrier. As such it is supposed to give all telephone companies a fair deal in the way of connections. But in order to get that fair deal, this Independent company was compelled to buy its equipment from the Bell factory. It is unjust and in flat violation of the spirit of the rules which the Department of Justice laid down when the Bell, frightened at the uproar over its monopolistic tactics, made its peace with the federal government several years ago.

It is known that the Bell licensees are opposed to the Western Electric Co. selling in the Independent field. They recognize the bad effects of this unfair competition. Besides, they say, the Bell factory is kept more than busy supplying their own needs, and they resent this foolish chasing of Independent business simply to cripple Independent manufacturers.

They know it piles up more grief for the Bell interests than it is worth. Besides, they are tired of pulling wires to help the Bell factory sneak away with an Independent order. Like "cooning" watermelons in the dark, the fruit of the pilfering expedition is often too green and gives the thief the colic. There is sure to be an epidemic of cholera morbus in the Bell camp on account of this unfair competition campaign.

Reports still come in to Telephony showing that Western Electric salesmen were recently at Mt. Vernon and West Plains, Mo., at Tipton, Ind., and Durham, N. C., soliciting Independent telephone business. This information indicates how hard it is for law-breakers to keep straight, even after promising reform. The only way to insure them playing fair is compulsion.

Give the Last Minute a Fighting Chance

By HERBERT KAUFMAN

Slug till the gong sounds—a well-planted blow loses nothing because it's late; a knockout is just as effective at the wind-up as at the square-off. Keep drawing cards as long as Fortune deals them. Four aces have the same value at any stage of the game.

The team that won't play equally hard in the ninth and first innings, hasn't a ghost of a show to finish with the leaders. No score is closed while a single batter has an unpitched ball ahead of him. The chemist who drops his experiment before he exploits the potentialities of all forms of matter isn't made of patient enough stuff for distinction.

Battle to the finish. It's never too late to do your level best—hope isn't worth a hurrah in Hades without some personal assistance. When in doubt, dare. Had Sheridan surrendered to despair, if Blucher had paused because of odds against him, or had Havelock's Highlanders slacked their pace for an instant—all would have been lost to the enemy at Winchester, Waterloo, and Lucknow.

We might never have had an incandescent lamp if Edison had been discouraged by the thousands of futile attempts which preceded his selection of a practical filament.

Archimedes' persistence as well as his genius must be credited with the detection of the goldsmith's dishonesty. Baffled at every turn, he continued his hunt for a key to the mystery, and eventually found it in his bathtub. His brain had no office hours while it held the problem. No time, no place could confine his thinking.

An inventor with less doggedness than Goodyear's, could not have survived the privations incident to his discovery of vulcanization.

There's a turning point in all affairs—strive till it arrives. You are not defeated before you have completed—hang on or hang back.

Empires crash, stock markets smash, ring championships pass, business deals take unexpected turns in the flash of an eye. Give the last minute a fighting chance. Don't quit while there's a clock-tick in your favor. Success may be behind the fifty-ninth second.

Use all of yourself all of the way. There's a burst of speed in your nature which never yet had a whole-hearted try-out. Little doubts trip you on the very threshold of realization. Your knees wabble on the homestretch. Time after time, opportunity was at your finger tips. One more stubborn effort would have brought it within reach, but you invariably flunked at the crisis.

We don't deny your general intelligence, but we do decry your inability to apply it in vital emergencies. A narrow margin flusters you—that's what makes you a ninety-nine percenter—you don't quite come through. You promise well, and then fluke at the critical moment.

We can't trust you with responsibilities—you aren't reliable. You don't stand up under big strains. You prefer to believe that you are not getting a square deal and wish you had the other fellow's "pull." But it's his push that you need.

You keep reminding us of how much you do, but we can't forget how much you don't. We cannot consider anything but results. The sole value that can be set upon energy is that established by its product.

A dairyman who won't take the trouble to repair his leaking cans, must not complain if he is only paid for the milk that is still in them at the point of delivery.

Copyright, 1916, by Herbert Kaufman.

Fundamental Principles of the Telephone Business

A Reading Course Designed to Present Logically the Principles Which Underlie Successful Organization and Operation of Telephone Properties—Prepared Under the General Supervision of Stanley R. Edwards—Part I, Telephone Economics, by James H. Shoemaker, Completed June 26, 1915—Part II, The Corporate Telephone Organization, by J. C. Kelsey and S. R. Edwards, Completed September 25, 1915—Part III, Telephone Accounting and Auditing, by James H. Shoemaker, Completed January 15, 1916—Part IV, Telephone Finance, by J. C. Kelsey and S. R. Edwards, Completed June 3, 1916—Installments Now Being Presented Comprise Part V, Telephone Advertising and Publicity, Written by Roy D. Mock

Quiz Questions on the Preceding Installment.

46. Discuss the power of an advertisement to force itself into attention.

47. What relation does size of space bear to the attention value of an advertisement?

48. Discuss the attention value of relevant and irrelevant illustrations.

49. What is the simplest form of repetition? What is said to be the most effective form of repetition?

CHAPTER V. Practical Advertising Psychology (Cont'd).

50. *Emotional Appeals.*—Appeal to human emotions if you would have your advertisement seen and read. We are all of us interested in human beings. Consequently, appeals which strike close to the experiences of all of us have a particularly strong power of attraction. An advertisement which plainly says "pleasure," "sorrow," "a chance to make more money," etc., is sure to be a more effective advertisement than one

Telephone Your Want
Advertisements
THE business manager of one of the leading daily newspapers in the city telephoned us the other day and suggested that we print a bulletin advising the public to telephone want advertisements to the newspapers. He said:
This merely illustrates one of the thousands of uses to which the telephone can be put. We shall describe other uses in succeeding bulletins.
By the way, have you a Telephone?
NEW YORK TELEPHONE CO.

Fig. 41. Emotional Appeal. Fig. 42. Use of Suggestion.

which merely tells a story without any particular emotional appeal.

If you would sell telephone service to a young mother, remind her how much safer the baby would be with a telephone in the home so a physician could be instantly summoned in case of need. Such an advertisement with the appeal to the fundamental emotion of mother love, would be extremely effective.

An advertisement headed "Mr. Business Man! Make That Business of Yours Hum and Grow," would be a successful advertisement if followed up by a talk on business-getting by the aid of the telephone. An advertisement of this nature would have two emotional appeals: The appeal to love of gain, and the appeal to the constructive instinct which is present in every man—that instinct which makes a man itch to build things, whether a house, a boat, or a business. Fig. 41 makes one's fingers tingle with curiosity to grasp the instrument and see how it works.

The picture of a smiling woman using a telephone has more selling value than the picture of a telephone instrument by itself. The reason is because it plainly says "pleasure." Call attention to the fact that all the best people in town have telephones and a successful advertisement will be produced. In this case the appeal will be to pride—one of the strongest of emotions. A certain well known automobile has been marketed almost entirely by the use of this pride-appeal.

The makers of this automobile pointed out that their car was built only for those who could afford the best in the way of motor car luxury. The price was high. A list of owners of the car sounded like selected names taken from the "Blue Book." Everywhere the appeal was to pride. The result was that people purchased this car just to prove they had the money to buy the best and to get a little bit the edge of their neighbors.

51. *Association of Ideas.*—The subject of association of ideas is rich in material for the experimental psychologist. From the practical advertising standpoint, however, the direct application may be stated as follows: The idea which next enters the mind, is the one that has been habitually associated with the idea at present in possession of the mind. This subject is very much like that of "repetition" discussed in section 49, TELEPHONY of August 12.

One who thinks of the word "shoe" will find his mind associating this word with such well-known trade names as "Douglas," "Walk-Over." "Florsheim," and names of other well-advertised shoes. Think of a suit of clothes. You will find yourself associating this idea with "Hart, Schaffner & Marx," or some other well-known manufacturer of clothing or, perhaps, there will be suggested to your mind the name of some tailor who has a reputation for making fine clothing.

Such associations of ideas have become so linked together with constant usage that it is habitual to think of the two ideas together.

When the people of a community think of "telephone," they inevitably associate the word with either Bell or Independent. Whichever association is called up in the public mind, depends

ELEPHONE Your Order for EASTER FLOWERS
"More than half of our orders are received by telephone," says a well-known Fifth Avenue florist.
"I cannot imagine doing business without telephone service. One of our young ladies devotes her entire time to handling telephone orders, and we are making a special effort to please our telephone customers. It would be poor business not to do so. Every up-to-date business house now recognizes the importance of telephone trade, and knows that telephone orders must receive prompt attention.
"Easter is the season for flowers, and it is always a busy time for us. I expect that this week telephone calls will be coming in faster than ever, and I have made special preparations in order that such calls may receive proper attention."
The florist is right. Easter is the season for flowers, so when you are making Easter eggs and bunnies for the little folk, do not forget Easter flowers for grown-ups. Just telephone the florist. He will aid you in your selection and deliver the flowers promptly.
Not only in ordering flowers, but in a hundred other ways the telephone demonstrates its usefulness.
By the way, have you a Telephone?
NEW YORK TELEPHONE COMPANY
Every Bell Telephone is a Reliable Messenger

Fig. 43. Suggestion Combined with Direct Command.

upon the thoroughness with which advertising has been done in that community. If you start thinking about cameras, you will soon find yourself thinking about a particularly well-known make of camera. There are possibly other cameras just as good but this camera is the one which is suggested to your mind first of all. If you were going to buy a camera, it would be easier to sell you a camera of this make than of any other. The chances are you would call for it by name and insist on buying it.

If every telephone manager will make for himself a few of these tests of association of ideas, he will soon discover why it is that continuous advertising pays. Such habitual associations of ideas are formed only by frequent and constant advertising. To make the people of any community associate the ideas of best telephone service with the Independent telephone company of that community, requires frequent and persistent advertising.

52. *Suggestion in Advertising.*—Start a flock of sheep down a road across which some barrier has been placed. When the first sheep reaches the impediment, he will of necessity jump over it. Then, even though you remove the obstruction, every other sheep in the flock will jump when it reaches this precise point. The reason is that sheep are subject to the power of suggestion. When the first sheep jumped, it suggested to every other sheep that it too must jump when it reached this point in the road. And the others did so without any necessity for such action.

In this respect, people are much like sheep. A person yawning in a room full of people, will set every other person yawning. The sight of a few prosperous business men drawing their money out of a bank will suggest that the bank is unsound, and a run on the bank will ensue. Criminologists have observed that when some crime is discussed in the public press, there is sure to be a regular epidemic of crimes of a similar nature. Reading about this one crime has suggested to those with criminal tendencies that they should commit the same crime.

From an advertising standpoint the power of suggestion of itself makes a very potent advertisement. "Use a Telephone" has undoubtedly been instrumental in inducing a great many people to use the telephone. Fig. 42 suggests a use for the telephone. In a city where each call adds to the revenues of the company, such a suggestion will undoubtedly result in enough increased business to more than pay for the advertising.

53. *The Direct Command.*—One of the strongest ways to suggest things to people is in the form of a direct command. The strength of the direct command lies in the fact that it relieves the one commanded from the trouble of making up his mind. This makes action easier. An officer controls a company of soldiers merely by commanding them. He does not reason with them or argue with them—neither does he compel them by force. But it is easy for them to act for the direct command has relieved them of the necessity of making up their minds.

"Use the Telephone," is a stronger suggestion than "You Ought to Use the Telephone." Perhaps no one would be willing to admit that he had used a telephone just because he had been so commanded. It is, however, quite certain that many people have used the telephone for no other reason than that they have been commanded to do so.

It has actually been proved under test that an advertisement which combines suggestion with a direct command will produce more returns than the same advertisement without the command. One good indication of the pulling power of such advertisements is found in the frequency with which the direct command is used in advertising. One who goes through the advertising section of any magazine is sure to be impressed by the number of direct commands. Fig. 43 combines good suggestion with a direct command.

(To be Continued.)

A Growing Virginia Telephone Company.

The Franklin (Va.) Home Telephone Co. was recently featured in the Tidewater News, of Franklin, Va. The Franklin Home company is a comparatively new organization, being formed in 1910 when W. N. McAnge, Jr., of Corinth, Miss., sole owner of the present plant, bought the property from the old Atlantic Coast Telephone Co. and converted it into a modern system. Mr. McAnge spent about $8,000 in remodeling the plant, installing a common battery switchboard with a capacity for 300 telephones and placing all the wires in cable.

The company now serves 240 city and 50 rural subscribers through the Franklin exchange and 45 subscribers through its Cortland exchange. Rodney M. Coggin has been manager of the company practically since its organization and it is largely through his efforts that the high efficiency of the plant has been maintained.

Rapid Progress Being Made on Key West Extension.

Construction work has been in progress for over a month upon the extension of the American Telephone & Telegraph Co.'s lines down the east coast of Florida, from whence a cable will be extended to Cuba. A force of 30 men is employed on this work and rapid progress is being made.

August Days

A Typical Situation—The Other Fellow Has Gold Mine

By J. C. Kelsey

John Jones had a daughter. He had little credit and for years had not done very well. He was quite a mechanic but his genius had not yet found a proper outlet.

It is said that every dog has his day and this may be readily applied to every man, if he will but wait with proper diligence until opportunity knocks at his door.

You are wondering about Jones' daughter. Well, this daughter was Jones' great asset. Jones had heard of the expiration of telephone patents and he had the girl all ready. All he had to do was to buy a small switchboard and connect a few reluctant, unbelieving subscribers to his switchboard.

Jones was happy for the first time in his life. He had a coil of iron wire on his arm and a pocket full of knobs. Besides, he had a few drops to adjust and there was an air of mystery about the whole business which gave Jones a chance to be known as a wise man and a wizard.

Jones offered business service at $1.50 per month. To coax reluctant householders to take telephone service (for economy always begins at home) Jones made a rate of $1 per month.

As time went by, Jones began to look prosperous and he purchased a house in which he placed the new switchboard. In fact, he began to be a man of importance and was looked upon as a comer; while he did not know it, he was the first real charity dispenser ever known to the city.

The farmers began to need telephones. They built to the city and Jones gave them free service. Jones also built grounded iron lines to adjacent cities, and because he was making so much money at home on $1.50 and $1 rates, he did not have the nerve to charge for the service. As a result, free service became a fixed institution in his locality.

Finally, business began to tell on Jones, so he hired a lineman who finally earned $50 a month. Well do I remember the magic of $50 per month. It always sounded big and even yet to the ambitious young man it must have the same fascination.

Anyway, Jones, Jones' daughter and Jones' lineman worked steadily every day of the year, and the numbers of their subscribers increased two-fold, four-fold and even ten-fold. Every one in the village became fully satisfied that Jones had a gold mine, and was charging too much for telephone service.

After 18 or 20 years, Jones got tired of the business. He felt that he should cash in and enjoy the fruits of his wisdom and labor.

His daughter, sixteen once, was now beginning to wonder what she was missing. She had worked faithfully for all those long years and had never thought of a settlement with father. In fact, she lived on enthusiasm and never once realized that youth and its corresponding joys were flowing into the iron wires of the telephone system and lost somewhere in the earth return of the circuit, really never to return.

The business men of the town had long watched Jones grow, and their wonder increased as the years went by. When Jones wanted to sell, he had ready buyers.

It mattered not that the switchboard was 20 years old, that the single iron lines had about rusted out, and that almost every telephone was of an antiquated magneto type. All the business men wanted was a chance to get into Jones' gold mine which sold telephone service to business men for $1.50, to residences for $1 and gave free service to the county.

The business men dickered with Jones. Jones had drawn a living out of the business and had paid for a nice home. He had an automobile and seemed to have a treasury to draw upon which had no bottom.

And the truth of the matter was that Jones really did have a gold mine, because he worked, his daughter worked and the $50 lineman worked, night and day, and when the receipts and expenses were cast up, Jones always had a nice sum of money left.

Even at the rates of $1.50 and $1, it is not hard to see that Jones could make the magnificent showing which so excited the admiration of the people of the town.

The business men paid $30,000 for the Jones property, but they did not buy Jones, Jones' daughter nor Jones' lineman—the real asset features of the property. Surely, the switchboard, iron lines, old telephones and free service were not worth $30,000—it must have been something else.

A new lineman will be hired who will want more money, and who will want to rebuild. New switchboard equipment, metallic lines, cable, telephones and supplies will follow. New operators will not work 24 hours, and they will want real money for wages.

Will $1.50 and $1 and free county service be continued? Will these rates pay a rate of return on $30,000 which will satisfy the business men? As a matter of fact, won't a rate of return on $50,000 be nearer the needs of the situation?

It will soon be found that the public that once secretly admired Jones, will not be so fond of the astute business men who can not do the work themselves. The public will demand improvements and concessions and commence to complain of the service simply because new hands have taken hold of a gold mine.

It is not the province of this story to cast ridicule, because the man Jones is purely an imaginary person. It is the province of this story to show how business men and the public generally sometimes get wrong ideas about telephone rates.

If a man, his daughter and a lineman choose to work for nothing, use the cheapest materials and practice most rigorous economy, they can make even $1.50 and $1 look extravagant. Likewise any telephone company which underpays its manager, operators and other help can do the same. Grocery, dry goods, even garages might give practically free service also.

If a telephone company anywhere is to be run at all as a business institution should be run—to pay all help reasonably and to work them reasonable hours, to set aside depreciation reserves and keep the capital intact—it cannot be operated at a profit on $1.50 and $1 rates.

No one wants to see the business men who paid $30,000 for the property get a shock, but who can doubt for a moment that they will not get one. When the property is modernized, put upon a business basis, with an eye upon the future, then everyone concerned will have some lessons to learn.

It seems to be human nature to think that the other fellow always has the gold mine. I always thought the hard coal business must be a joyful one, judging by the number of price advances which have come to the public in a decade. Yet a prominent coal operator told me seriously that the plight of the hard coal business is a pitiable one and its future is as dark as Egypt.

It seems to us its plight is almost as shameful as that of the packer who, were it not for saving the grease and the hopes of saving the squeal, would be standing on the corner with his hat in his hand.

Even the bankers worry as they look along the line of the future.

It might be a good thing if the Jones' property were bought by a group of business men quite often. If it were done many times, we would hear little protest about increases in rates.

We would hear even less about $1.50 and $1 rates, and might be surprised to learn that a group of business men had made a pilgrimage to the public utilities commission pleading that the local telephone company be allowed to double its rates.

Unless the business gives such radical treatment to business men, our $1.50 and $1 idea will be hard to kill.

The idea of free county service is the most insane of all. One cannot telegraph from town to town in the county for nothing; yet the business man of Jones' community pays bigger telegraph bills than telephone. One cannot get a livery horse or an automobile to go to a neighboring county town free; yet there is more money paid for livery hire than the telephone company.

The grocer will not deliver free beyond the town limits and even the long suffering druggist finally rebels at this. Yet the telephone company, barely supported at home, is supposed by all to give free service everywhere.

Where in the world did these queer ideas originate? Does it go back to the story of the original Bell stockholder who is reputed to have received $1,600 for the original use of his dollar?

Does it go back to the optimistic telephone promoter who promised so much for the lone iron wire, the telephone and the earth?

Does it go back to Jones, Jones' daughter and Jones' faithful $50 lineman who ate freely at Jones' table when nearby?

At any rate the guilty $1.50 and $1 party has never been found.

Today there are four classes of service which are possible to the telephone-using public.

First, the so-called universal or $40 per year service, which contemplates modern equipment, well-paid help, sufficient reserves and 8 per cent. on the investment.

Second, the Independent service, which has less charges to pay, and may be called the $20 to $30 class, which also contemplates modest yet modern equipment, well-paid help, sufficient reserves and 8 per cent. on the investment.

Third, the Jones' service which charges the public from $12 to $15, contemplates obsolete apparatus, does its own work and never has a thought of reserves.

Fourth, the mutual or farm service which runs from $2 per year up to $12.

It is plain that the average Bell $40 charge cannot be applied universally. A community accustomed to Jones' service charges could not and would not survive the shock of a triple or quadruple charge.

Our largest cities would not care for cheaper service because they are accustomed to a more extravagant scale. The Jones' service charges satisfy a great majority of the people, while the mutual service class has its great following.

It is surely convincing that one great, grand and universal telephone system, with one charge and one rule, would have its own troubles as it grew older. It is hardly conceivable that the telephone business is anything but a local issue.

One fact remains in all force. Every other industry on earth has increased its prices. Never before has the public been so resigned to the inevitable rise in costs. Surely no excuse exists why telephone companies should not make a master effort to get a fair price for its service.

If it is not done today, we may expect to go down in history as an industry which told opportunity to knock at its door again. Some day may we not hope to hear of the death of those dreaded industrial twins, $2 and $1, and $1.50 and $1.

Jones had a faithful daughter, an industrious lineman and drew no salary. He ignored depreciation, had no labor troubles and built up a telephone system. Does it prove that $1.50 and $1 is enough?

MORAL: The proof of the pudding is in the eating.

Earnings of Bell System for Half Year.

The total operating revenues of the Bell telephone system in the United States for the first half of 1916 were $127,500,000, an increase of $13,029,000 over the first half of 1915. The expenses increased likewise—$83,733,000, as against $75,859,000 in the same period of last year. The operating income was $35,961,000, an increase of $4,642,000. June revenues increased in keeping with the previous five months.

On June 30 the system owned more than 19,000,000 miles of wire, or 1,145,000 more than on June 30, 1915. It had 9,521,664 stations, an increase of more than 650,000 over a year ago.

The earnings for June, 1916, compare with those of June, 1915, as follows:

June:	1916.	Increase.
Total operating revenue	$22,000,263	$ 2,293,024
Operating expenses	14,588,909	1,510,544
Net operating revenue	7,411,354	782,480
Net after tax	6,114,250	714,646

The report of the entire Bell system for the six months ended June 30, 1916, compares with that of the same period in 1915, as follows:

Total operating revenue	$127,500,391	$13,029,682
Operating expenses	83,733,126	7,874,086
Net operating revenue	43,767,265	5,155,596
Net after tax	35,961,558	4,642,377
Miles wire owned	19,008,792	1,145,087
Bell stations owned	6,270,482	527,297
Bell connecting stations	3,251,182	123,452
Total stations	9,521,664	650,749

Annual Report of California Telephone & Light Co.

The report of the California Telephone & Light Co. for its fiscal year ended June 30, 1916, compares with that of the previous year, as follows:

	1916.	1915.
Gross telephone revenues	$ 51,325	$ 49,756
Gross electric revenues	75,198	72,967
Miscellaneous revenues	1,030	531
Totals	$127,553	$123,254
Expenses, including taxes	77,511	69,610
Net revenue	$ 50,042	$53,644
Interest accrued	26,194	23,789
Balance	$23,848	$29,855
Amortization debt discount and depreciation	4,071	4,240
Balance	$19,777	$25,614

Municipal System Installed in Coldwater, Ontario.

The town of Coldwater, Ontario, Canada, has just completed the installation of its municipal telephone system. The plant is all cable and is one of the most complete systems of its size in Canada.

The High Frequency Output of Telephone Transmitters

Discussion of the Efficiency of Telephone Transmitters as Affected by Their Design and Circuit Conditions—Resistance Variations—Effect of Battery Supply on Transmitter Output—Distortion Due to Diaphragm Inertia—Final Installment

By E. W. Kellogg

The high frequency electromotive force produced by the action of a transmitter depends upon the variations in resistance which result from sounds striking the transmitter diaphragm. The greater the variations, other things being equal, the greater the high frequency voltage. Transmitters are therefore designed to produce the greatest changes in resistance that can be obtained without sacrificing other necessary qualities.

Resistance Varations in Transmitters.

Of all substances known, carbon is the most sensitive to changes in contact pressure, showing great difference in contact resistance for slight changes in pressure. The contact resistance between any two conductors decreases as the pressure is increased. When two bodies are pressed together, they undergo slight elastic deformations which increase the contact area. If the specific resistance of a material is high, the contact resistance is correspondingly high as well as the range of variation in contact resistance.

The high specific resistance of carbon, and its entire freedom from corrosion, are essential properties for a successful microphone. Hard graphite or carefully selected anthracite coal are used for transmitters, the hard material being desirable because it does not crumble.

One of the first systematic studies of the microphone type of transmitter was carried out at the Massachusetts Institute of Technology. As the experiments illustrate well some of the characteristics of carbon contacts, they will be described briefly. A Blake transmitter was used in the tests. The microphone contact in the Blake transmitter was between a globule of platinum carried on the diaphragm and a carbon button carried on a spring which held the contact closed with a light pressure.

The set of experiments consisted in weighting the carbon button and measuring the alternating current caused by a sound of constant pitch and loudness. Different weights were tried and it was found that increasing the weight caused the current to increase up to a certain point, and then decrease. (Fig. 4-*A*). This result was attributed, at first, to the increased average pressure resulting from the weights.

To test this theory, the mean pressure was changed by altering the spring tension, and it was found that the lighter the pressure, the larger the current produced (Fig. 4-*B*). So the experimenters were forced to the conclusion that the beneficial result of the added weights was due to the increased mass of the button and that, beyond a certain point, the advantage in a further increase in mass was more than offset by the disadvantage of excessive pressure. Fig. 4-*C* shows the effect of adding mass to the button without altering the mean contact pressure. The advantage of loading is evident from the following:

The diaphragm can communicate pressure to the contact only by moving, and its movements are limited principally by its

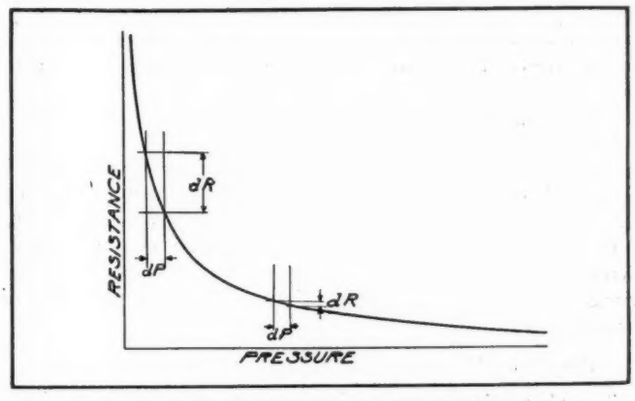


Fig. 5. Characteristics of Contact Resistance.

own stiffness. If now the carbon recedes every time the diaphragm advances, the latter can accomplish very little in the way of causing pressure changes. If the carbon button is so loaded that it cannot follow the vibrations of the diaphragm, the latter can communicate the pressure to the contacts with very slight movements, the pressures exerted on the diaphragm by the sound waves being taken up largely by the contact instead of by the elastic force of the diaphragm.

Fig. 5, which is typical of the form of a curve of resistance against pressure for a single contact, illustrates the fact that the lighter the pressure (short of actual separation), the greater the variations in resistance which a given change in pressure will produce.

The granular carbon transmitter invented by Hunnings solved the problem of securing very light contact pressure, since the only force tending to hold the particles together is their own weight. In order to secure the advantage that was given by weighting the carbon in the case of the Blake trans-

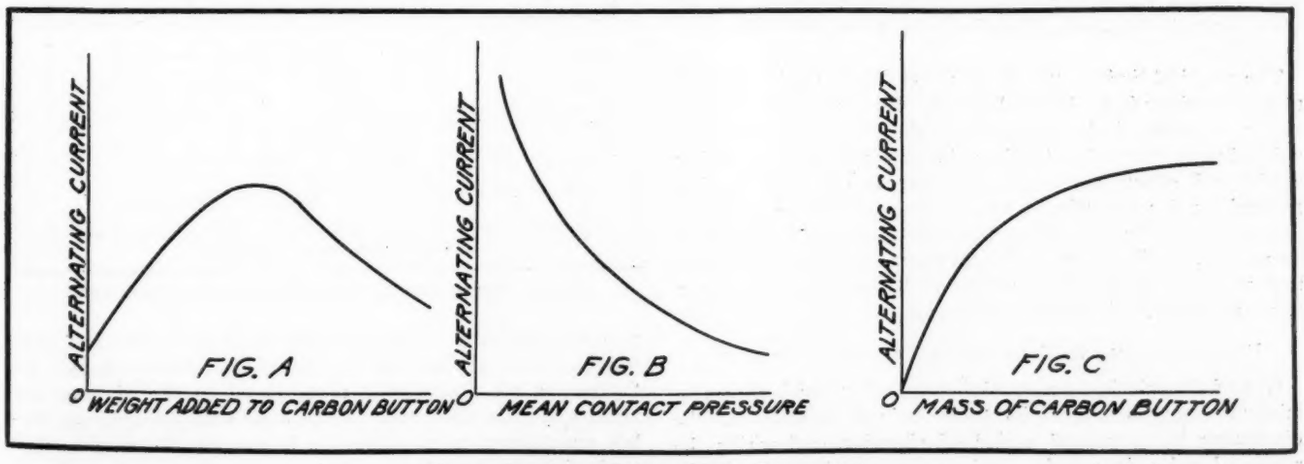


Fig. 4. Results of Tests of Blake Transmitter.

mitter experiments referred to, the rear plate or electrode of the granular transmitter is designed to be held very rigid. It was from this feature that one of the most extensively used of the granular carbon transmitters was called the White "solid back." It is also desirable that the pocket of carbon particles be made

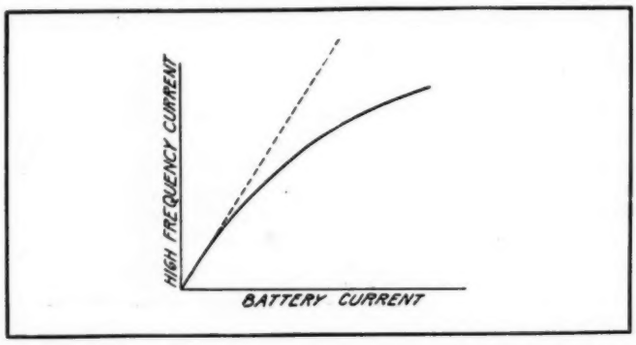


Fig. 6. Effect of Battery on High Frequency Output of a Set.

shallow from front to back, in order that there may be as little "give" as possible in the carbon.

The Hunnings transmitter was so successful, especially in the matter of producing good volume, that nearly all later designs have embodied the same principles. There have been, to be sure, other types using various shaped pieces of carbon and arranged to secure numerous contacts, but none of them has rivaled the transmitter of the Hunnings type in commercial importance.

Effect of Battery Supply on Transmitter Output.

The alternating electromotive force resulting from a given variation of resistance is directly proportional to the battery current passing through the transmitter. It is not found in actual experience, however, that the benefit from increased battery supply which might be expected from this rule is fully realized.

If a telephone set is connected to a line and the current resulting from a given sound is measured, the relation between battery supply and current output will be found to resemble the curve of Fig. 6 instead of the direct proportionality which is indicated by dotted line. This difference may be ascribed in part to two causes:

As the direct current is increased, the transmitter becomes decidedly warm and it is reasonable to suppose that the working contact points become quite hot. The resistance of carbon decreases as the temperature increases and the microphone action becomes less effective.

A second cause which lessens the advantage of increased battery supply, is that the strong direct current in the windings of the induction coil tends to saturate the core with the result that a larger share of the high frequency current from the transmitter is required to produce the necessary changes in magnetism.

The practical limit to the direct current that may be supplied to a transmitter is set by the heating. When a transmitter becomes over-heated, it frequently begins to cause sputtering noises known as "frying." The point at which frying or other detrimental effects appear is somewhat variable. A 20-ohm transmitter, for example, may carry an ampere or more at one time satisfactorily and at another time give trouble with half an ampere. It is necessary to standardize resistances and battery voltages so that the current will be less than the lowest value at which bad effects may appear.

Distortion Due to Transmitter Diaphragm Inertia.

One of the principal causes of distortion for which the transmitter is responsible, is the inertia effect in the diaphragm. The diaphragm has a natural period of vibration well within the range of voice frequencies, and as the sounds approach the pitch corresponding to the natural period the vibrations of the diaphragm become very much amplified. A curve showing this effect is given in Fig. 7. This curve was obtained by C. F. Meyers and J. B. Whitehead, who gave their results in a paper presented before the American Institute of Electrical Engineers, in June, 1912. The diaphragm of the transmitter was actuated by mounting on it a small piece of iron and placing an electromagnet close to the iron, the current through the actuating magnet being kept constant at 4 milliamperes.

The force acting on the diaphragm was considered as proportional to the current through the electromagnet winding.

The amplitude of movement of the transmitter diaphragm was indicated by the magnitude of the alternating current output, the transmitter being supplied with a constant E. M. F. How unequally sensitive the transmitter is to sounds of different pitch, is clearly brought out by the curve. There are seen to be two resonance frequencies, both well within the range of frequency required in speech.

The effect of this resonance is to greatly exaggerate sounds of certain pitches and occasionally to cause something like a shriek in the telephone, when a particular note is hit. That there are two resonance frequencies is explained by the fact that the diaphragm is capable of vibrating as a whole, and also of assuming a higher mode of vibration with the motion at the center and near the edge and with a node between.

The following means are used to minimize the inertia effects in transmitter diaphragms:

1. The diaphragm and moving electrode must be as light as possible.

2. The difficulty could be reduced by using a stiffer diaphragm, but this would reduce the amplitude of its movements. For a given design of carbon chamber, the output of the transmitter is proportional to the diaphragm movements, so that the limit of possibilities in this direction is soon reached.

3. Damping is resorted to and is usually accomplished by means of rubber pads or cushions, held against the back of the diaphragm by springs.

4. The carbon microphone should be designed to accomplish the desired changes in resistance with the minimum movements of the transmitter diaphragm. It is the changes in pressure, rather than movements of the carbon, which determine the resistance variations, and the less give there is to the carbon, the less motion of the diaphragm is necessary. If the pressure against the carbon rises rapidly when the diaphragm moves forward, the mechanical effect is equivalent to stiffening the diaphragm.

The stiffer the diaphragm, the higher the frequency at which resonance occurs, and the more nearly the vibratory action ap-

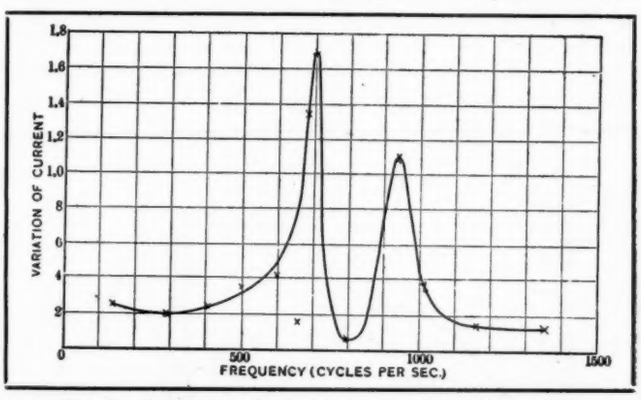


Fig. 7. Resonance Curve for Transmitter Diaphragm.

proaches that of a diaphragm with elasticity of but negligible weight. Such a diaphragm would give no distortion, the deflection at all times being proportional to the air pressure against it. The most that can be done with the granular carbon transmitter, in this direction is to make the moving electrode light and the distance between the electrodes small.

Digest of Telephone Articles in Various Publications

Prepared by Arthur Bessey Smith

PULLING IN LEAD-COVERED UNDERGROUND CABLES, by H. S. Percival. Electrical Review and Western Electrician, Vol. 69, No. 3, July 15, 1916, pages 119-120; five drawings.

This paper describes very concisely the current methods of handling lead-covered cable while pulling it into the ducts, as

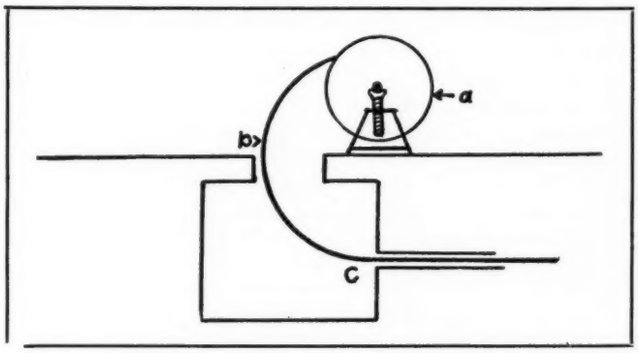


Fig. 1. Position of Cable Reel.

well as the preparation of the ducts beforehand. Hand windlasses have been abandoned as too slow, and power-driven drums used. The motive power is usually a gasoline engine, either mounted on a wagon or truck, or, what is often better, the motor of the automobile truck itself. The gearing is such as to produce a peripheral drum speed of 50 to 90 feet per minute. Lower speeds are too slow, higher speeds do not permit proper inspection of the cable.

Rodding is usually done before the pulling crew come on the scene, wires being left in the ducts which have been thoroughly cleaned. The reel must be set up on the side of the manhole toward the pull (Fig. 1) so as to minimize bending the cable. The man in charge sits at *b*, where he can see and signal easily. It is usually advisable to insert a mandrel between the pulling-in rope and the cable to clear the duct.

Several set-ups for the pulling-in work are shown and described but that of Fig. 3 seems the best, because it permits pulling the cable farther into the manhole on the initial pull. Woven wire grips for holding the cable are good for ordinary work. If the pull is severe, the woven wire grip may pull the sheath off. This case requires a grip which will hold the core as well as the sheath. Such a one is described. Mandrels are usually made of hard wood, one-fourth less than the diameter of the duct. Three-fourths to one inch manilla rope is large enough for small cable, and larger cable may take steel rope.

ON TELEPHONIC MEASUREMENTS IN A RADIO RECEIVER, by J.

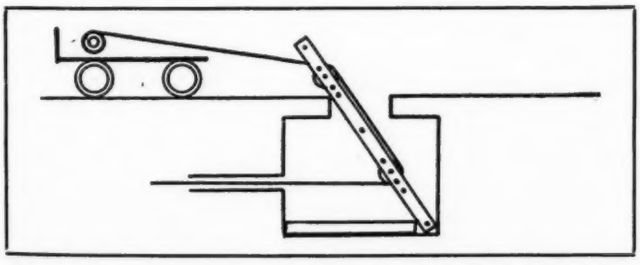


Fig. 3. Arrangement for Pulling Cable Farther on Initial Pull.

Zenneck. Proceedings of the Institute of Radio Engineers, Vol. 4, No. 4, August, 1916, pages 363-369; four diagrams.

This paper discusses means for measuring the audibility of a received current. The current in the detector circuit is a pulsating one, whose frequency is the same as the group frequency produced in the transmitter or receiver. The movement of the diaphragm of the receiver is determined by the alternating current component of this pulsating current. This audio-current is measured not in amperes, but in an arbitrary unit, that amplitude which just permits an observer to distinguish between dots and dashes. Audibility is defined as the ratio of the amplitude of the actual current to the amplitude of the weakest current permitting distinguishing between dots and dashes. This measure is not fixed, varying between observers and conditions.

The general method of measuring audibility employs a non-inductive shunt across the receiver terminals. This is reduced until the limit is reached as to distinguishing dots and dashes (Fig. 1). If the reaction of the vibrating diaphragm of the telephone receiver can be neglected, the current in the receiver is

$$I_0 = I' \frac{R}{\sqrt{(R+R_t)^2+(2\pi N L_t)^2}}$$

in which I' is the amplitude of the audio-current in branches AA' and BB', R_t is the audio-frequency resistance of the receiver, L_t its audio-frequency inductance, and N the group frequency.

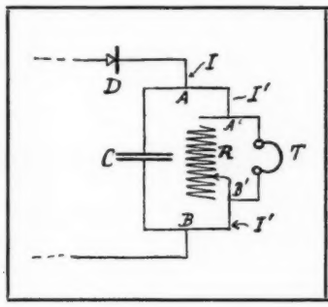


Fig. 1.

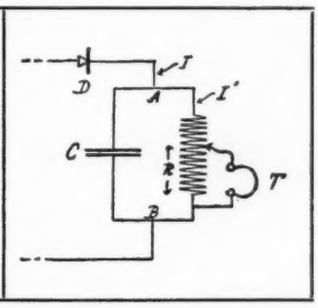


Fig. 2.

When the shunt is removed, the current in the branch will be some value, I'', then the audibility, A, will be

$$A = \frac{I''}{I_0} = \frac{I''}{I'} \times \frac{\sqrt{(R+R_t)^2+(2\pi N L_t)^2}}{R}$$

In order to eliminate the two current values, I' and I'', they must be made equal to each other. But this demands conflicting conditions. It is possible, by Fig. 2, to measure the ratio between two audibilities.

It is general practice to use the relation $A=(R+R_t)/R$ as the audibility, but it is not true on account of the inductance of the telephone receiver.

IRISH REBELLION, by E. Gomersall. Post Office Electrical Engineers' Journal, Vol. 9, Part 2, July, 1916, pages 77-86; five half-tones.

This article describes the Dublin post office buildings and equipment, both telegraph and telephone, as they existed before the recent uprising. Soon after noon on Easter Monday the rebels took possession of the post office and drove out the staff. During the fighting the post office men established temporary offices at intermediate points and maintained connection with the outside world. Wire-cutting was very generally practiced by the rebels, and it required much dangerous work on the part of the post office engineers and employes to repair the damage and keep up the service which was very necessary for the military operations of the government. Outside of Dublin and suburbs the wires were cut in more than 60 places, while

inside the city the damage was much larger. Some was due to the fighting, in one case a bullet passed through a 75-foot stout pole, three feet above the ground, through the protection pipe and lodged in the cable.

When the fighting was over, the staff began the work of restoration. The post office building was a wreck and still hot from fire. After having the fire department cool the debris, the manhole was opened and the work of testing the cables and diverting them to a temporary office started.

AUTOMATIC EXCHANGE DEVELOPMENT. Post Office Electrical Engineers' Journal, Vol. 9, Part 2, July, 1916, pages 179-180.

This is a short statement of the growth of the automatic telephone plants in England, including the opening of the Portsmouth exchange with 5,000 automatic lines. A number of manual exchanges are listed as having been replaced with automatic, and the data given as to lines and telephones.

PRESENTATION OF THE FRANKLIN MEDAL TO J. J. CARTY AND THE ELLIOTT CRESSON MEDAL TO THE AMERICAN TELEPHONE & TELEGRAPH CO. Journal of the Franklin Institute, Vol. 182, No. 1, July, 1916, pages 69-101; two half-tones.

This account begins with the correspondence between the Institute and the medallists. Dr. Keller, in introducing J. J. Carty, told briefly the story of Mr. Carty's life and connection with the telephone system of which he is chief engineer. Mr. Carty's response is entitled "The Telephone Art", in which he characterized the telephone as exclusively American. He traced the growth of the business from a small beginning to the present large organization, which at last presented America with the transcontinental telephone and the wireless telephone from Arlington, Va., to Pearl Harbor, in the Hawaiian Islands, also from Arlington to the Eiffel tower at Paris, France.

In introducing Theodore N. Vail, president of the American Telephone & Telegraph Co., Dr. Keller referred to the staggering figures which represent the size of the telephone system. Mr. Vail spoke very briefly about the policy of useful utility and universal application of the telephone, and accepted the award as a tribute to every member connected with the service.

Construction Work in Florida During 1915.

During the year ended February 29, 1916, according to the annual report of the Florida Railroad Commission, the sum of $490,167 has been spent by Florida telephone companies in new construction and extension work. New switchboards have been installed by the various companies during the year at the following exchanges: Blountstown, Bradentown, Clermont, Davie, Jacksonville, Lakeland, Milton, Ovieda, Palatka, St. Petersburg, Sanford, Tallahassee, Tampa and West Palm Beach.

Multiplying Its Desirability.

"Don't you find the telephone a great convenience?" bubbles Mrs. Lightnit. "You can sit in your home and talk all over town."

"Yes," admitted Aunt Susanna, dolefully, "it is handy, but it's only on a four-party line. My sister Debora down in the country is on a twelve-party line and she can hear the gossip of the whole country."

Proceedings Before Commissions, Courts and Councils

Discussions and Rulings of State Bodies Having Supervision Over Telephone Companies, Decisions of Courts in Matters of Interest to Public Utilities and Actions of City Councils Relative to Franchises, Rates and Service

Canadian Supreme Court on Connection Charges.

The Supreme Court of Canada has dismissed an appeal made from an order of the Dominion Board of Railway Commissioners. Three questions were submitted in the appeal, three members of the court answering the questions unfavorably to the Independents, and two favorably. There are 85,000 Independent telephone subscribers in Ontario and Quebec whose interests are affected by this decision.

The questions submitted were as follows:

(1) Whether the Dominion railway board has power under the Railway act and amending acts to authorize the charging of any additional toll or charge outside the established rates of the Bell Telephone Co. of Canada as a condition precedent to or as compensation for the use of long distance lines of the Bell company.

(2) Whether the board is authorized under the Railway act and amending acts to give compensation in respect of the loss of business to the Bell Telephone Co.'s local exchange business occasioned by giving Independent companies long distance connection.

(3) Whether the board has power to authorize the payment of a special toll as a condition precedent to companies competing with the Bell obtaining long distance connection with the Bell, while not subjecting non-competing companies to a like toll, in view of provisions of the act relating to discrimination.

Chief Justice Charles Fitzpatrick bases his judgment directly upon the statement that the Bell Telephone Co. of Canada has to take from its local exchanges to maintain its long distance service, which statement is disputed by the Independents. Justice Idington, on the other hand, gave a judgment in line with the judgment of Henry Drayton, chief commissioner of the railway board, favoring the Independents' contentions.

The chief justice answered all three questions in the affirmative. Justice Brodeur answered all in the affirmative, as did Justice Anglin. Justice Idington, while opining that the appeal should be allowed with costs, and the questions answered accordingly, declared that the first question is ambiguous and can hardly be answered by a simple "yes" or "no." His opinion is that there can be no discrimination in favor of the respondent or anyone else, or as against anyone. However, he holds that it may be necessary to alter the established rates from time to time to award proper compensation, and that is within the jurisdiction of the board. The other two questions he answers in the negative.

Justice Davies answers to the first and third questions "Yes," and to the second, "No." He is quite in accord with Mr. Drayton's statement in his reasons for the dissenting opinion he delivered, that he was unable to read the somewhat extended clause applicable as creating a new and novel law of compensation covering the business losses suffered by one public service corporation as the result of competition with another public service corporation. He agrees with them that these possible business losses were not matters the board was concerned with unless they were found so great as to justify the refusal of the order, and that, as Mr. Drayton puts it, "compensation for the actual use, connection or communication for the actual facilities supplied and for its subsequent use," is all that the board can consider and award.

Following the decision of the supreme court, the executive committee of the Canadian Independent Telephone Association met and considered what action should be taken. While

nothing definite was decided on, it is understood that the fight is going to be carried further. The executive committee adjourned to meet again on September 6, when a decision will be arrived at as to what form that action shall take.

The Ontario government encouraged municipalities to go into the telephone business, and practically fathered the business, so it is directly interested in seeing that they get fair treatment. The fight will likely have to be made on the Act of Parliament. The point is whether "compensation" means. or does not mean, payment for the actual work of switching and nothing more. That it does mean only this, is, in the opinion of a member of the executive committee, the idea that was in the minds of a majority of the members of parliament who voted for it.

Upon the appeal of the Independents being dismissed, the Bell Telephone Co. immediately notified several companies operating under the old order of the Dominion railway board that it had ceased to exist. The Blenheim & South Kent Telephone Co. was in favor of severing connections with the Bell. Other companies have not taken action yet. The Blenheim company agreed to continue the Bell connection for six months, and at the end of that time to buy out the Bell in Blenheim and South Kent or to sell its holdings to the Bell.

To Test Validity of Maysville (Ky.) Franchise.

The Maysville (Ky.) Telephone Co., part of the Central Home Telephone & Telegraph Co., is at the present time in a controversy with the city, as to whether or not the company is operating under a valid franchise. The issue turns on the point that the franchise was created by the city council at a time when Thomas A. Keith, president of the Maysville Telephone Co., was a member of it.

The old franchise expired in July, 1915, and the new franchise was issued in August, dating from expiration of the old one, to run for 20 years. It provided, among other things, that the company was to be authorized to advance the rates when the old equipment was replaced by new. This franchise was duly advertised and formally purchased, all according to law, and the company operated under it without question for a year.

The new common battery system was installed last May and two months later, after the new plant was working smoothly, the company sought to advance the rate according to the terms of the contract.

Then a few complaints were received and City Attorney Calhoun has given an opinion that the franchise is invalid because the company's president was a member of the council which created it. The state law he cites as providing that no city official shall be interested directly or indirectly in a contract with the city. The attorneys for the telephone company insist that the point is not well taken and that a public service corporation has a different status than an individual, and declare that the franchise will be upheld.

The city, however, has ordered the $50 received for the franchise returned and the four free telephones taken out and the city attorney has been instructed to bring suit. This will question both the validity of the franchise and the right of the company to make the advance in rates.

New Franchise Under Consideration at Glasgow, Ky.

The city council of Glasgow, Ky., is considering the matter of creating a new franchise to be sold to the New Glasgow Telephone Co., recently created by the merger of the Glasgow Home Telephone Co. and the Gainsboro Telephone Co. The company may, with the consent of the city, operate either under the old Home franchise, restricting rates, or the old Gainsboro franchise which stipulates no rates, but must have the consent of the city in either case.

The old Home rates were: Business telephones, $2 and $2.25; residence, $1.

The old Gainsboro rates, reduced shortly before the merger, were: Business telephones, $2, and residence telephones $1, both subject to 25 cents discount.

Since the merger the following rates have been announced: Business lines, $2.75; residence lines, $1.65.

The city proposes to make a general investigation of the matter of telephone rates in Kentucky before taking definite action on the franchise.

Ticker Case Goes to U. S. Supreme Court.

Chief Justice Arthur P. Rugg, of the Massachusetts Supreme Court, has granted a writ of error to the Western Union Telegraph Co. to take to the United States Supreme Court the decree of the former which upheld the decision of the Massachusetts Public Service Commission ordering the telegraph company to furnish Calvin Foster, a Boston broker, with continuous quotations from the New York stock exchange.

The writ of error was based on constitutional grounds. The chief justice has also directed that the order of the commission be stayed until the federal court shall reach a decision. The writ was granted on the ground that it is a question whether the ticker service is interstate or intrastate business.

At the hearing before the justice, counsel for Mr. Foster opposed the suspension of the commission's order on the ground that if two or three years are required to settle the case in the federal court, great hardship will be sustained by the suspension of Mr. Foster's desired installation.

Mackay Company May Use City Streets in Fort Worth.

When the Mackay Telegraph & Cable Co. made application to the city commission of Fort Worth, Texas, for permission to lay a conduit for long distance telephone wires through an alley in the business section of the city, City Commissioner Jamieson sought to block the issuance of the permit because of his claim that the company had not paid all of the taxes due the city.

The city's legal department reported, however, after an investigation, that the company's claim that it had a right to use any public street under the federal post roads act was correct and that the commission's approval was merely a formality. The company, having accepted the conditions of the act, which subject the company to federal orders in time of military need, is entitled to the use of any post road in the United States, and, the act declares, all city streets and public highways are post roads.

Railroad Must Bear Expense of Moving Wires.

The right of a railroad company to force a telephone or electric light company to raise its wires over crossings of the road when the former had prior rights, was recently denied by the Nebraska State Railway Commission. This ruling was handed down in a controversy between the Northwestern Railroad Co. and the electric light company at Bristow, Neb., owned by the city.

It appeared that the city council gave the railroad company the right to run a spur through its streets. After the spur was run the railway company complained that the wires of the city electric light plant were not strung high enough to meet the law and demanded that they be raised.

The city appealed to the state railway commission, which declared that where the rails of the company were laid after the wire company had strung its wires, the expense of raising the wires must be borne by the railroad company.

Right to Use of City Streets.

The acceptance by a telegraph company of a grant by city ordinance, of a right to erect poles and wires in streets, and its performance of conditions imposed, such as opening an office in the city, create a contract which cannot be rescinded except for good cause. Ordinance 161 of the city of Vandalia, Ill., requiring the removal of poles and wires from streets and not

authorizing placing them underground or elsewhere, is, as against a telegraph company operating a line of poles and wires in such streets under previous accepted ordinance, invalid, because unreasonable. City of Vandalia vs. Postal Telegraph Cable Co., Supreme Court of Illinois, 113 Northeastern, 65.

Injury to Lineman Question For Jury.

In an action by a lineman of a telephone company against that company and an electric light company for injury from a live wire of the latter company, caused by the negligence of both companies, evidence as to his previous experience and warnings, by appearance of wire and shouts of others before picking up the wire to make the street safe, was held to make the question of his contributory negligence for the jury. Brazos Valley Telegraph & Telephone Co. vs. Wilson, 187 Southwestern, 234.

Summary of State Commission Hearings and Rulings.

KANSAS.

September 12: Postponed hearing on application of the Missouri & Kansas Telephone Co. for permission to increase its rates at Wellington, Kan.

MAINE.

August: The commission authorized the sale of the Raymond & Webbs Mills Telephone Co. to the Poland Telephone Co., on the grounds that an improved service can be rendered by the consummation of this deal. The agreed price was $900.

MISSOURI.

September 18: Hearing in the matter of adopting a uniform system of accounts for telephone companies. Every telephone company in the state has been given notice that it will be expected to be present or to be represented, and to introduce any evidence necessary to assist in the promulgating of a uniform system of accounts for telephone companies. Case 937.

September 18: General conference in which representatives of all telephone companies in the state are to meet with the commission and to introduce all testimony and evidence required in the adoption of uniform rules, regulations and practices.

NEBRASKA.

August 4: The commission ruled that where a railroad company had laid its rails after the stringing of the wires of a telephone or electric light plant, the expense of raising the wires must be borne by the railroad company. This ruling was made in a controversy between the Northern Railroad Co. and the city electric light company at Bristow, Neb.

August 9: Hearing at Fairbury on the complaint of farmers in that vicinity against the rates and service of the Lincoln Telephone & Telegraph Co.

August 11: Hearing on application of the Kearney Telephone Co. for permission to increase its rates conditional upon the plan for the consolidation of the Bell and Independent exchanges in Kearney, Neb., being carried through.

OHIO.

August 14: The commission modified and amended its order of December 30, 1912, to consent to and authorize the issue by the Union County Telephone Co., of Marysville, Ohio, of its common capital stock of the total par value of $11,300. The proceeds arising from the sale of $8,300, par value, of the capital stock is to be used for the reimbursement of the company's treasury for moneys expended from income for the construction of improvements, extensions and additions to its plant and property. The order made December 30, 1912, insofar as it consents to and authorizes the issue of $30,000 common stock and directs the expenditure of the proceeds of $17,000 par value of such stock for the construction of additions, extensions, etc., is rescinded and the modified and amended order readopted. Order 405.

August 15: In the matter of the joint application of the Home Telephone Co., of Ironton, and the Central Union Telephone Co. for permission for the former to purchase from the latter its telephone exchange at Ironton, the commission has fixed a final valuation of the combined telephone properties in Ironton, as follows: Total reproduction value, $155,463; total depreciation, $31,281, or 20.1 per cent.; total present value, $124,182.

TENNESSEE.

August 22: Hearing on complaint made by the Southern States Independent Telephone Association against the Cumberland Telephone & Telegraph Co., alleging discrimination in rates in East Tennessee.

WEST VIRGINIA.

September 12: Hearing on the application of the four Bell telephone companies of West Virginia for a proposed consolidation. The companies include the Consolidated Telephone Co. of W. Va., with offices in Wheeling; the Chesapeake & Potomac Telephone Co. of W. Va., the Central District Telephone Co. and the Chesapeake & Potomac Telephone Co. of New York. These companies have 45,000 Bell stations in West Virginia. The proposed name for the merged companies is The Chesapeake & Potomac Telephone Co. of West Virginia. Protests against the merger may be filed by any subscriber or citizens of the state.

WISCONSIN.

August: Complaint filed with the Wisconsin Railroad Commission by Edward J. Groth, et al., of Morrison, Wis., against the Manitowoc & Western Telephone Co. and the Wisconsin Telephone Co., because of discontinuance of service through the Greenleaf exchange of the Manitowoc & Western company.

August: In the case of the Bangor Telephone Co. vs. the Chicago, Milwaukee & St. Paul Railway Co. it was alleged the high tension signal system of the railway company interferes with the line of the telephone company. As the result of changes by the railroad company in its signal system, the commission found by tests, made by the engineering department, that the transmission is about as clear as can be expected from grounded circuits and the application was dismissed. An analysis of the tests made is included in the decision, and this may be of value to other telephone companies having similar trouble.

August: Application filed by the Fremont Telephone Co., Fremont, Wis., for authority to issue $1,000 of its capital stock for the purpose of building extensions in the town of Bloomfield, Waushara county.

August: The Wisconsin Railroad Commission allowed an extension by the Wisconsin Telephone Co. in the city of Peshtigo. The Harmony Telephone Co. was affected.

August: Non-duplication notices have been filed in the following cases:

Owen Telephone Co., Owen, Wis.; proposed extension in Hoard, Clark county; companies affected: Curtis-Withee Telephone Co. and Midway Telephone Co.

Wisconsin Telephone Co., proposed extension in York, Columbia county; companies affected: Interurban Telephone Co.

August: The Eastern Wisconsin Telephone Co., of Chilton, notified the Wisconsin Railroad Commission that it has put into effect the rates for New Holstein ordered in the decision of July 10, 1916.

August: The commission received notice of the organization of the Spooner Evergreen Mutual Telephone Co., of Spooner, Wis.

August: The commission dismissed the petition of E. W. Posselt, et al., vs. the Larson Telephone Co., and the Readfield Telephone Co., asking for a physical connection between the two companies. The only means of communication between the two companies at present is over the toll lines of the Wisconsin Telephone Co. via Appleton and Neenah. It was contended at the hearing that a line should be built between Larson and Readfield. The Larson company objected on the ground that there was no assurance that the possible revenue would support such a line.

It was brought out that the Wisconsin Telephone Co. has a toll line from Hortonville to Larson through Medina Junction, which latter station is only six miles from Readfield. It was also ascertained that the Wisconsin Telephone Co. was willing to extend a toll line from Medina Junction to Readfield and thus provide a direct connection between the two points in the controversy. Later the Wisconsin Telephone Co. did construct such a line and has established a toll rate from Larson to Readfield of 10 cents per message for two minutes, and five cents for each additional minute. The petitioners asked for an option rate of 1 cent per message or a flat rate of $3 per year. The railroad commission found that the desires of the petitioners have been met, with the exception of the unlimited rate of $3 per year. The commission did not find that such a rate would be adequate and in consequence the petition was dismissed.

August 14: Hearing at the city hall, La Crosse, Wis., in the matter of proposed extension by the La Crosse Interurban Telephone Co. in the town of Campbell.

August 18: Hearing at the village hall in Highland, Wis., in the matter of petition by George E. Sins, et al., against the New Union Telephone Co. and Farmers' Central Telephone Co., in which physical connection is asked.

"Telephony's" Home Study Course for Telephone Men

A Complete Presentation of the Principles Underlying Modern Telephony in All Its Branches—Arranged Systematically So That Regular Reading and Faithful Study Will Qualify Ambitious Men for Higher Positions—Prepared Under Supervision of Stanley R. Edwards—This Section Written by Jay G. Mitchell

Quiz Questions on the Preceding Installment.

453. What made it possible to use batteries of one voltage only in the operation of common battery telephone equipment?

454. What additional equipment is required for the operator's set when it is served from a 24-volt battery rather than from a two-volt battery?

455. What determines the voltage of the charge of condenser, *X*, in Fig. 159?

456. What effect upon the charge of condenser, *X*, in Fig. 159 does a variation in the transmitter resistance have?

457. How does the condenser, *Y*, in Fig. 159 prevent direct current from the battery from passing through the winding of the operator's receiver, *R*?

CHAPTER XX. The Operator's Equipment (Cont'd).

458. *Arrangement with primary not included in the battery circuit.*—In Fig. 160 is shown another simple arrangement of the operator's set wiring with a reactance coil. The induction coil in this arrangement is designed to operate without any direct current from the battery through the primary winding. The circuit traversed by the transmitter supply current is traceable from battery through the reactance coil, *M*, and the transmitter, *T*, to the other pole of the battery. The primary winding of the induction coil in series with the condenser, *X*, is bridged around the transmitter.

In the arrangement shown in Fig. 159, the fluctuating currents passing back and forth to the condenser through the induction coil primary are superimposed upon a steady flow of current from the battery. In the arrangement shown in Fig. 160 the currents, due to variations in transmitter resistance, pass through the primary winding in *series* with the condenser. No steady

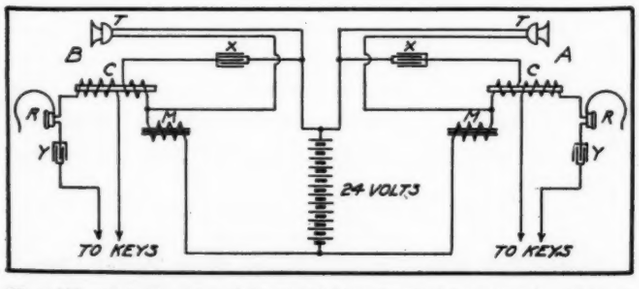


Fig. 160. Simple Operator's Telephone Wiring with Impedance Coil and Alternating Current Primary.

flow of direct current from the battery passes through the primary winding of the induction coil. Therefore, the alternating currents which charge and discharge the condenser, *X*, must build up and then reverse the magnetic flux in the core of the induction coil. In the arrangement of Fig. 159, on the other hand, these alternating currents merely vary the strength of the *existing* flux, due to the direct current from the battery through the reactance coil, *M*.

The design of the reactance coil, condenser, and induction coil must, in each case, be worked out to give the desired re-

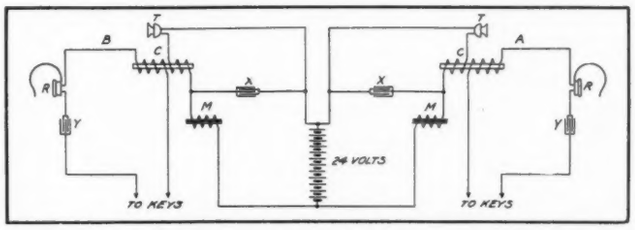


Fig. 159. Simple Operator's Telephone Wiring with Impedance.

sults under the operating conditions peculiar to the type of circuit in which they are used. This is necessary for the following reason: The current through the primary winding of the induction coil in the arrangement of Fig. 159 is always in the same direction but it is varied in strength by the action of the transmitter. The primary current, on the other hand, flowing through the primary winding in the arrangement of Fig. 160 is alternating and builds up its magnetic field afresh for each reversal in direction of flow.

In both circuit arrangements, the effect of the variation in the transmitter resistance is a variation in the magnetic flux threading the *secondary winding* of the induction coil. This produces, in both cases, the alternating voice-carrying currents which are sent out on the cord conductors and the telephone line to the other party to the conversation. In all the simple wiring schemes so far shown for operators' sets, the full voltage of the alternating voice-carrying currents, both incoming and outgoing, is expended in forcing them through the operator's receiver, the secondary of the induction coil and the telephone circuit. That is to say, the operator hears the sounds affecting her own transmitter as well as those coming to her from the subscriber, and her head telephone and secondary coil winding interpose as much impedance in the circuit traversed by the voice-carrying currents flowing in one direction as they do in the other.

459. *The arrangement with two induction coils.*—In Fig. 161 is shown an arrangement of the equipment comprised in an operator's telephone set designed to afford a greater voltage to outgoing voice-carrying currents flowing to the subscriber than is impressed upon the terminals of the operator's head telephone as a result of the operation of her own transmitter.

In the most common form of this wiring arrangement, two induction coils are employed. The primary windings of the two coils, 6—7 and 8—9, are connected in parallel and the

combination of the two in series with the transmitter, *T*, and the reactance coil, *M*. By this arrangement any variation in the transmitter resistance results in a corresponding variation in the strength of the current flow in the primary windings of *both* coils.

Disregarding for the moment, the receiver, *R*, it may be readily seen that the circuit leading to the keys is connected to the two secondary induction coil windings which are in *series*. These secondary windings are so connected that the induced electromotive force in each, due to variations in the current flowing in the two primary windings, is always in the same direction. The two windings of the two coils are connected in *series* so that the voltage of the induced currents in one is added to that of the induced currents in the other, being in the same direction. The voltage of the induced voice-carrying currents sent out to the subscriber, therefore, is equal to the sum of the induced voltages in both secondary windings of the two induction coils.

The equipment is so arranged that the current through the winding of the head telephone, however, is not determined by the voltage of the outgoing voice-carrying telephonic currents. Neither is it so strong when due to the effect of sounds upon the *operator's* transmitter as it is when due to incoming currents from the subscriber. This is the result of the arrangement of the circuit connections leading to the terminals of the operator's receiver.

The resistance, 4—5, is designed to have the same opposing effect to voice-carrying currents as the *average subscriber's telephone circuit*. Therefore, when the alternating current in the subscriber's telephone circuit is an induced current *originating* in the secondary windings 1, 2, 3, of the two operators' induction coils, very little current, under average line conditions, will pass through the winding of the head telephone. This is illustrated in Fig. 162 which represents the impedance conditions supposed to be obtained by this arrangement (Fig. 161) in the operation of the set.

460. *Operation of the anti-side tone arrangement.*—Referring to Fig. 162, suppose that the induced, outgoing alternating voice-carrying currents have the direction, for the instant, shown by the solid arrows. Since the resistance, 4—5, is of

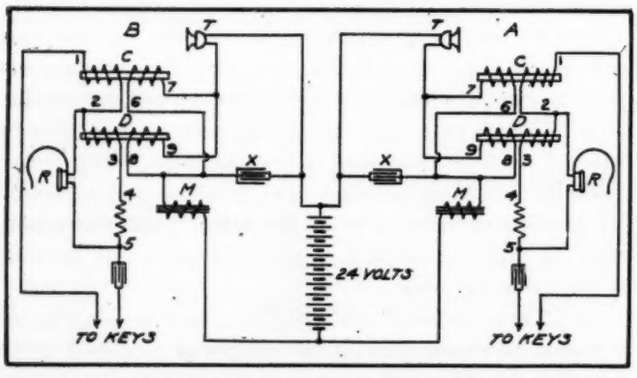


Fig. 161. Wiring with Impedance Coil and Split Primary.

about the same impedance to the voice-carrying currents as the average subscriber's telephone circuit, exactly one-half of the voltage of the outgoing voice-carrying currents will be expended in reaching the point 5.

The terminal of the operator's receiver connected at the point, 2, is connected at a point between which and the point, 1, is induced exactly one-half the total voltage of the outgoing voice-carrying currents flowing in the two secondary windings of the induction coils. Therefore, the two terminals of the receiver will be connected, in the *average case*, to two

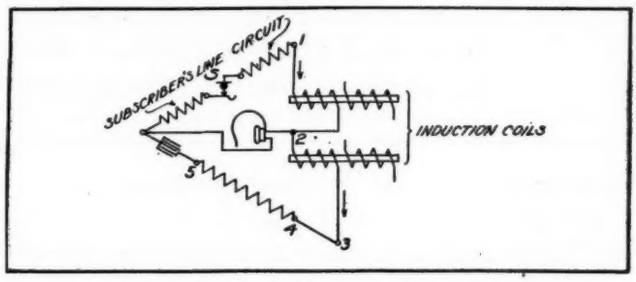


Fig. 162. Operator's Side-Tone Circuit Conditions.

points of equal potential. Accordingly, no current will flow through the winding of the *operator's receiver* when the voice-carrying currents originate in the secondary coils of the two operators' induction coils.

When the voice-carrying current originates at the subscriber's telephone, *S*, on the other hand, the resistance and reactance of the secondary, 2—3, plus that of 4—5, and the condenser are not included in the circuit traversed in reaching the operator's head telephone. The receiver is, in fact, a short-circuit of rather low impedance across the loop comprising the secondary winding, 2—3, the condenser and the resistance, 4—5, so that the greater portion of the voice-carrying currents *must* pass through it in preference to the alternative loop of higher impedance.

The resistance, 4—5, which has the necessary qualities to offer about the same opposition to the voice-carrying currents as the average line circuit, is the fruit of the most exhaustive tests by the company employing this arrangement. As a matter of fact, it has an ohmic resistance of about 360 ohms. It is incorporated in the induction coil winding in such a way as to make it impossible to connect the coil to the circuit and leave this resistance out of the circuit. The entire arrangement is known as an *anti-side tone* arrangement. Side tone in telephone engineering practice, is the reproduction in a telephone receiver of the sounds picked up by its associated *transmitter*.

It is obvious that such sounds are very likely to obscure and interfere with the transmission of the voice-carrying currents as they reach the operator from the distant telephone. For that reason it is considered essential that side tone be reduced as much as is possible, provided that it is done without at the same time reducing the efficiency of the incoming transmission.

(To be Continued.)

Lower Toll Rate Out of Chicago Over Postal Lines.

New long distance telephone rates, which are from 20 to 50 per cent. under the Bell company's rates, are announced by the Postal Telegraph-Cable Co. to many points within a 200-mile radius of Chicago. The Postal company is fast simplexing its wires for combined telegraph and telephone service and will shortly have a long distance telephone service in operation between the principal points in the East and Middle West at rates materially lower than Bell rates.

Practical Subjects—Letters and Discussions

Progress vs. Profit.

By B. Franklin Oneliner.

In any business it is necessary to keep expenses down.

* * *

Unless expenses are less than income, there is no profit.

* * *

But this matter of cutting down expenses may be overdone.

* * *

Some people become so infatuated

* * *

With cutting out unnecessary expenditures,

* * *

That they cut out many needed improvements.

* * *

A telephone company may become so engrossed in

* * *

Dividends, depreciation accounts, and surplus funds,

* * *

That it becomes niggardly in operating its plants,

* * *

And causes the service to suffer.

* * *

It costs money for a telephone system

* * *

To have meetings for its wire chiefs or managers

* * *

To educate them by observation and instruction.

* * *

It also costs money to hold meetings

* * *

Or institutes of instruction for operators

* * *

To teach them improved methods and keep them up to date.

* * *

It even costs money for a competent man

* * *

To inspect the exchanges of a company.

* * *

To find out how the work is being handled,

* * *

And if all branches receive proper attention.

* * *

I am sorry to say there is some expense attached to

* * *

Making a telephone office an attractive place,

* * *

And putting in proper office furniture and fixtures.

* * *

These things, and others which you may think of,

* * *

Cannot be classed as absolutely necessary expenditures.

* * *

But if your company is paying an 8 per cent. dividend,

* * *

And putting aside a 5 per cent. depreciation reserve,

* * *

And has several per cent. more as surplus profit,

* * *

Possibly you cannot afford any of these things.

* * *

But can you afford to ignore

* * *

Everything of a progressive nature?

* * *

We must all admit a company may save money

* * *

By assuming a policy of inactivity

* * *

And having no meetings for its operators or managers,

* * *

Nor ever investigating the condition of its exchanges,

* * *

Nor spending a cent to improve

* * *

The working conditions of its employes,

* * *

Nor attempting to improve the service of subscribers.

* * *

But your economy may be carried to a point

* * *

Where it should be considered extravagance.

* * *

Does your company practice

Any of the following "penny-wise, pound-foolish" customs?

* * *

Buying second-hand rigs and second-grade horses.

* * *

Or old, second-hand automobiles.

* * *

Buying four-inch top (toothpick) poles.

* * *

Buying anything except the best grades of wire.

* * *

Buying switchboards or telephones from the lowest bidder.

* * *

Letting competent employes go because too high priced.

* * *

And retaining those who are cheap.

* * *

These methods will undoubtedly save *your* company money,

* * *

But what does it lead to? A condition only too apparent

* * *

In many small telephone companies.

* * *

This condition is just

* * *

The opposite of progress, or effective organization.

* * *

It permeates the entire organization of some companies—

* * *

Subscribers, stockholders, directors and managers.

* * *

Subscribers, fearing improved service will mean increased rates.

* * *

Stockholders not wishing to put profits into better service,

* * *

When they can get by with what they are giving.

* * *

Managers, because of lack of energy,

* * *

Or ability, or experience to do things.

* * *

These are strong statements,

* * *

But many progressive men who met nothing but opposition

* * *

When they have attempted some constructive measures

* * *

Can testify to the truth of this condition.

* * *

Oh, Lethargy and Inactivity! Thou art worthy foes!

* * *

But greater enemies than you have been routed.

* * *

The walls of Jericho were not too strong

* * *

To be leveled by persistence.

* * *

The Army of the Lord marched around the city

* * *

Every day for seven days.

* * *

And on the seventh day they marched around seven times.

* * *

Then at a blast upon the ram's horn, the walls fell!

* * *

That was miraculous,

* * *

But we, too, may be able to accomplish wonderful results,

* * *

If our blasts upon a ram's horn

* * *

Are sufficiently loud and persistent.

* * *

We can shake even such adamantine foes as

* * *

Lethargy, Self-satisfaction, and so-called Conservat'sm.

Trouble Records for Small Systems.

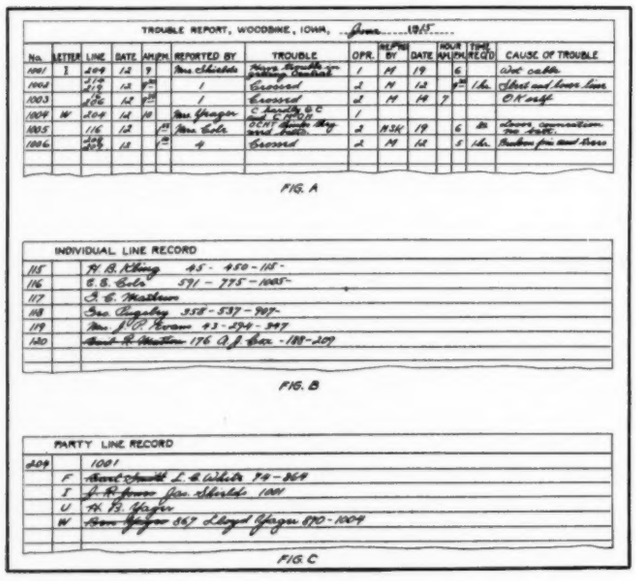
By Arthur Bessey Smith.

That the Independent telephone business of today is run by businesslike men is evidenced by the attention which is being paid by managers to the control of troubles and their originality in devising ways and means for assuring themselves

that derangements of the service shall be promptly corrected. H. A. Kinney, general manager of the Woodbine Telephone Co., with headquarters at Woodbine, Iowa, has for some time been using a system of records which seems to us particularly well adapted to exchanges employing a few operators.

The record consists of two parts, the trouble report and the line record. The latter is divided for convenience into individual and party line records. All reported trouble is recorded by the operator on the trouble report. After being repaired, a reference number is posted into the line record, so that at any time it can be known exactly how many times a line or telephone has been reported in trouble. Further, the exact nature of each can be ascertained.

The horizontal lines of trouble report, Fig. *A* are numbered consecutively throughout the year, beginning with Jan-



TROUBLE REPORT, WOODBINE, IOWA, ..June.....1915.....

No.	LETTER	LINE	DATE	A.M./P.M.	REPORTED BY	TROUBLE	OPR.	HELPER BY	DATE	HOUR A.M./P.M.	TIME REQ'D	CAUSE OF TROUBLE
1001	J	204	12	9	Mrs Shields	Mrs Smith on getting Central	1	M	19		6	Wet cable
1002		214 215	12	9		Crossed	2	M	12	9	1h.	Short and Lower Line
1003		106	14	9		Crossed	2	M	14	7		O.K'ed
1004	W	204	14	10	Mrs Yeager	Central, G.C. Ind. L. Ground	1					
1005		116	12	12	Mrs Cole	O.K'd Smith Boy and Hello	2	M.H.	19		6	Wire connection Mrs Smith
1006		106 205	12	2		Crossed	2	M	14		5	Broken pin and Cross

FIG. A

INDIVIDUAL LINE RECORD

115		H. B. Kling 45 - 450 - 115 -
116		C. B. Cole 571 - 775 - 1005 -
117		J. E. Mathews
118		Geo Quigley 555 - 537 - 907 -
119		Mrs J. D. Hearn 43 - 574 - 947
120		Frank R. Mathews 176 G.J. Gen. - 188 - 209

FIG. B

PARTY LINE RECORD

204		1001
	F	Frank Smith L. & White 79 - 869
	I	J. H. Hearn Gen. Merchts 1001
	U	H. B. Yeager
	W	Geo Yeager 867 Lloyd Yeager 870 - 1004

FIG. C

Set of Trouble Records for a Small Exchange.

uary 1. Whenever a trouble is reported, the operator enters the line number with the station letter if any, followed by the day of the month, the hour to the nearest five minutes, the name of the person reporting the trouble, the nature of the complaint, and the number of the operator who enters the record.

When the repairman comes into the office in the morning, he copies off such information as he requires, and goes after the trouble. As fast as he clears the cases, he reports them in, tests with the operator, and receives his O. K. The operator then fills out the rest of the line by writing down the initials of the repairman, the day of the month, the hour, and the time required to fix the trouble, also the cause. If other cases have been entered, the operator can assign them to the repairman, such as he can reach with due regard to time and place.

Periodically the numbers of all the trouble complaints are posted into the line records, Figs. *B* and *C*. For individual lines there is one horizontal row for each line, containing the name of the subscriber and the numbers of the cases reported. The party line record—chiefly rural lines—has one horizontal row for the line in general, and one for each of the stations on it. Thus, a ten-party line requires eleven lines in the book. General trouble, crossed lines, grounds, etc., are entered opposite the line number (see line 204, complaint 1,001, which proves to be a leaky line due to wet cable). If a subscriber on the line reports a trouble which is general, the complaint number is entered after the station which reported it, as well as after the line itself.

The moving of subscribers is taken care of by crossing out the name of the person leaving and writing the name of his successor to the number and station.

One of the most satisfactory features of the system is the absence of many small tickets and much copying of data. The information itself is entered but once, and that by the operator who takes the complaint and the one who tests with the repairman. Thus the original papers are in the office and in the hands of the office force so that there is little chance of anything being lost.

It is also a good thing for the management to have a record of this kind when a subscriber comes into the office and complains that his telephone has been out of order ten times in the past month!!! The matter can be easily settled by referring to the subcriber's number in the record of lines, where will be found the number of times that complaints have been made.

If the subscriber makes statements about the kind of trouble which he has been having, that also can be checked by looking up the complaint numbers in the trouble report. It places the management in the position to speak with certainty, and makes for the securing of equitable treatment between company and patron.

"Telephony's" Home Course for Telephone Men.

(Not meant for study.)

By Well Clay

Through the mists that covered the marshes,
Ere the darkness gave way to the light,
I winged my way at break of day
In a scared precipitate flight.

The hour of my peril was at hand
For the air was chill with the autumn,
And the hunters abroad in the land
Soon would start the bombardment.

Swift were my wings, but swifter
Flew the shot from the guns below,
That pierced my breast, and I sailed distressed,
Where the rushes could hide my woe.

With a splash I struck in the water
And quickly dived from the sight
Of the dogs, that tried to retrieve me,
And I'm waiting long ages for night.

My wounds burn, bleed and fester;
I am dizzy and sick with the pain,
'Tho my thoughts turn oft' to the Southland
That I am never to fly to again.

With darkness will come but fresh terror;
Night will but bring some new foes;
The slinking mink and the muskrat
Will be added to my burden of woes.

I can hear the men at their sporting
Sing and laugh in their glee,
For they love the joys of hunting—
But it does not look so funny to me.

There are always two sides to most questions. Sometimes things look a lot different to us than at other times and our future actions are apt to be influenced along that line if we but stop to look at the other fellow's side of the matter. Up here in Minnesota it took the farmers several years to get a telephone bill through the legislature, which would give them state supervision of the telephone companies, and thus secure for them some measure of protection against the inordinate greed of the rural companies which were charging all the way from 25 cents to a dollar a month for telephone service.

Well, they finally got what they wanted. But the gun kicked so hard that it is not at all pleasing to the unreasonable farmer. He finds out that the law is bound to bring about the publicity into the companies' affairs, which his curiosity desired, but it also, by reason of the publicity

through the reports of the Minnesota Railroad & Warehouse Commission will bring about higher rates eventually, if the law is administered fairly—and there is every prospect that it will be.

First, it was the rural subscriber who thought he was being hunted for both sport and profit in the telephone game. But now it begins to clearly appear that it has been the little rural companies which have been getting the result of most of the random shots. It seems in every paper one picks up that articles on the inevitable rise in prices in all lines of endeavor are being published. Now if the ordinary small telephone company admittedly was not making anywhere near what it ought to have been making "before the war", where are they getting off at now?

When the farmers wanted to reduce rates, or at least keep the existing rates where raises had gone into effect, what did they do? They all acted at once and stood together as long as they could, sometimes to their great profit temporarily when they bluffed the company into backing down. And were it not for the fact that there were so many subscribers, who had to go without service, to the one telephone manager who had to stand only a temporary loss, they would have won out in most cases, like the Irishman who rushed out on a cold winter night to kill a dog that refused to stop its mournful howling.

He was very scantily clad but being agile, succeeded in just grabbing the end of the dog's tail as it leaped over the board fence. He could not pull the dog back as the leverage was too small and being Irish, he wouldn't let go. His wife, after a time missed the partner of her joys and sorrows and going to the door, she called to him. He answered that he couldn't come in as he was attending to the dog. Upon inquiry as to what he was doing to the dog, he announced that he was freezing the brute to death by holding him in suspension over the fence—only he said it in Irish.

That is what generally happens to the community which tries to freeze a telephone company to death, to influence its rates. It is hard on the company but harder on the community. Would the ordinary telephone manager think of selling some nice new wire, which he has just shipped in, at the old time price? Not on your life. Would he sell dry batteries to owners of motor cars at the same old price? Hardly. Will he continue to sell telephone service for the same old price? Very likely, at least most of them will, until their successors are appointed to take over the job they are on and try to make the operations of that company pay a profit.

It is like the liquor question. Absolutely without defence, it still flourishes and someone always pays the price for its unwarranted continuance. Every community will pay the price of having a telephone company, which is not making a fair profit, operate within its precincts. It will pay double because it will not only pay in poor service but many members who invested in the stock of the concern will lose their money.

The best community on earth is not necessarily the one that transacts the largest volume of business but it is the one which can say that every merchant or other business man is making a fair profit. Every man will feel he is making a living and he will feel that he is as good as the rest. He will be willing to spend his money for the merchandise which his neighbor merchant has for sale and he should be willing for the telephone man to make a fair profit too.

The community that has a telephone company which is struggling for its continued existence on inadequate rates, should be the one to say: "Here, raise your rates to a proper level and we will stand by you." Does it do it? It does not. That community will fight the hardest to strangle what little life there is left. Why? It is a law of nature for the weak ones to be attacked and vanquished utterly.

The strong ones will see to it that they do not wait until their strength is sapped before they engage in the fight but will precipitate the trouble at once. They will get adequate rates or know the reason why. Their audacity wins as often as anything else for, although everyone professes to despise people who seem to be grasping for what is thought to be more than their share of the world's goods, yet we secretly admire them for what they get and wish we had the "nerve" to do likewise. They have our outward respect at least. The wounded and the weaklings have little to hope for in the forest and on the lakes and streams, so why should the weakling telephone company hope for what he is afraid to go after?

APHORISM: If you think it, you can do it!

Bureau of Standards on Electric Service.

Circular No. 56, of the United States Bureau of Standards, entitled "Standards for Electric Service," discusses the most important factors constituting and promoting safe and adequate electric service, the circular being based on a careful study of the experience of operating electric companies and regulating bodies, both state and municipal. The circular contains, first, rules and recommendations for the regulation of electric service companies by state commissions; second, three different ordinances suitable for adoption by towns and cities in states not having regulation by commissions (the first for towns and small cities, the second for cities generally and the third for large cities having an electrical inspector); and third, specifications for the approval of types of electric meters by commissions.

The rules suggested as suitable for the consideration of state public service commissions, are the result of conferences and correspondence with such commissions, and careful study and comparison of existing orders and rules.

The suggested regulatory ordinances for electric service in cities are based on a very careful study of the subject and conferences with many operating companies and others qualified to express opinions.

Ordinances regulating electric service are so far in force in a very few towns and cities, and in most instances are limited in application to meter inspections and tests. Three different ordinances, varying in scope and length, so as to make them useful in municipalities of all types from small towns to the largest cities, are proposed and discussed. It is believed these suggested ordinances will be of considerable interest and value to municipal authorities in cities and towns situated in states not having commission regulation of electric utilities.

A brief description of the electrical testing equipment provided by each state commission for the calibration and standardization of "working test standards" used by central stations in their meter work, and for making tests on consumers' meters upon complaint to commissions, is of interest to operating companies, and particularly to commissions considering the equipment of similar laboratories.

In appendixes are reprinted certain sections of state public service commission laws, relating particularly to the regulations of electric service as to adequacy and safety and in addition, tables and summaries on various phases of voltage regulation, meter testing, and general central station statistics.

The bureau asks for criticisms and suggestions from operating companies, commissions, state and city inspectors, committees of associations and engineering societies and all others interested in the establishment of proper standards for electric service. Copies of Circular No. 56 may be obtained free by addressing a request to the United States Bureau of Standards, Washington, D. C.

From Factory and Salesroom

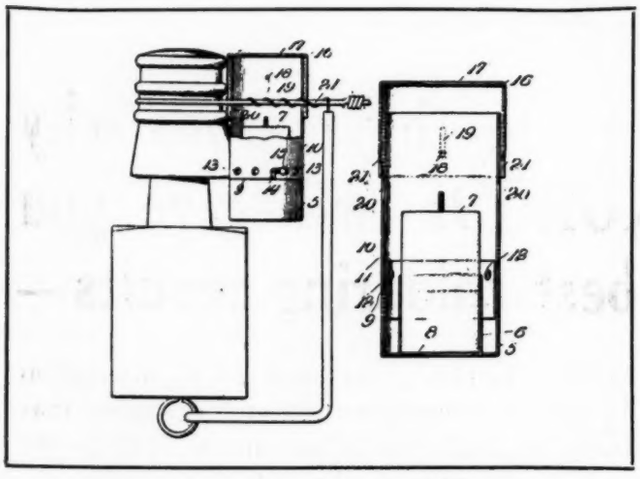
Conventions: Indiana Independent Telephone Association, Indianapolis, September 14-15; United States Independent Telephone Association, Chicago, December 5-8

A New Lamp for Soldering Line Wires.

The soldering lamp shown in the accompanying illustration was designed by John N. Haven, of Walla Walla, Wash., for the use of linemen and electricians generally, but more especially for telephone linemen.

This lamp is not intended as a competitor of the gasoline blow torch. The use of the latter is not favored by companies in soldering line wires because the extreme heat produced anneals or crystalizes the wires so that they often break from the tension to which they are subjected. The Haven improved soldering lamp, as this device is called, uses a small amount of heat which, being applied directly to the point desired, solders the joint without any danger of burning or annealing the wire.

Telephone installers and inside wiremen, it is said, will find that this lamp will accomplish all that any lamp now in use will accomplish, with the additional feature that it



Sectional Diagram of Haven Soldering Lamp.

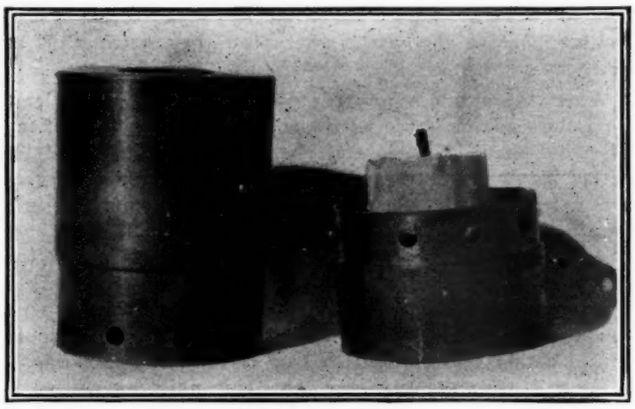
can be used for lighting. It requires no other fuel supply than the candle, thereby reducing the fire hazard of liquid fuel. It can be used for lighting purposes to better advantage than the candle alone, as its base acts as a holder or candle stick supporting the candle in an upright position, retaining all the melted tallow.

The lamp can be lighted in very strong winds and by means of a draft register, it is claimed, will keep a sufficiently steady flame to perfectly solder a joint at any time.

As shown in the accompanying drawing the tubular body contains a holder for a candle. In the bottom of the cylinder is a hole through which the candle may be adjusted in height. The top of the cylinder receives the lower end of a shield which slidably fits around the cylinder and rises therefrom to shield the flame from the wind and concentrate the heat.

In that portion of the sleeve, 10, which foots the ferrule, 11, of the cylinder, 5, are draft openings, 13. The cylinder also has openings, 12, for the same purpose. The draft may be regulated by turning the sleeve so that its openings, 13, register more or less with the openings, 12. In the bottom edge of the sleeve, 10, is a bayonet slot, 14, through which extends a headed stud, 15, carried by the side of the part, 11, whereby the sleeve, 10, is detachably connected to the cylinder, 5. The upper horizontal portion of the slot permits the sleeve to be rotated to regulate the draft.

The sleeve, 10, is closed by a cap, 18, fitting over its top, the top of the cap having an opening, 17, for the insertion of the solder stick. The cap is held in place by studs which



The Haven Improved Soldering Lamp.

guide the cap by the vertical slots, 19, the slot being provided that the cap may be slid up and down when placing the lamp on the wires to be soldered.

In use, the device is placed on the wire by raising the cap a sufficient distance to uncover the slot. Sliding it on the wire, the cap is then let drop so that its slot seats over the projecting wire. Thus all draft is excluded at this point and the device is held suspended and the hands of the operator are left free for the soldering operation. The device was patented in December, 1915, by Mr. Haven.

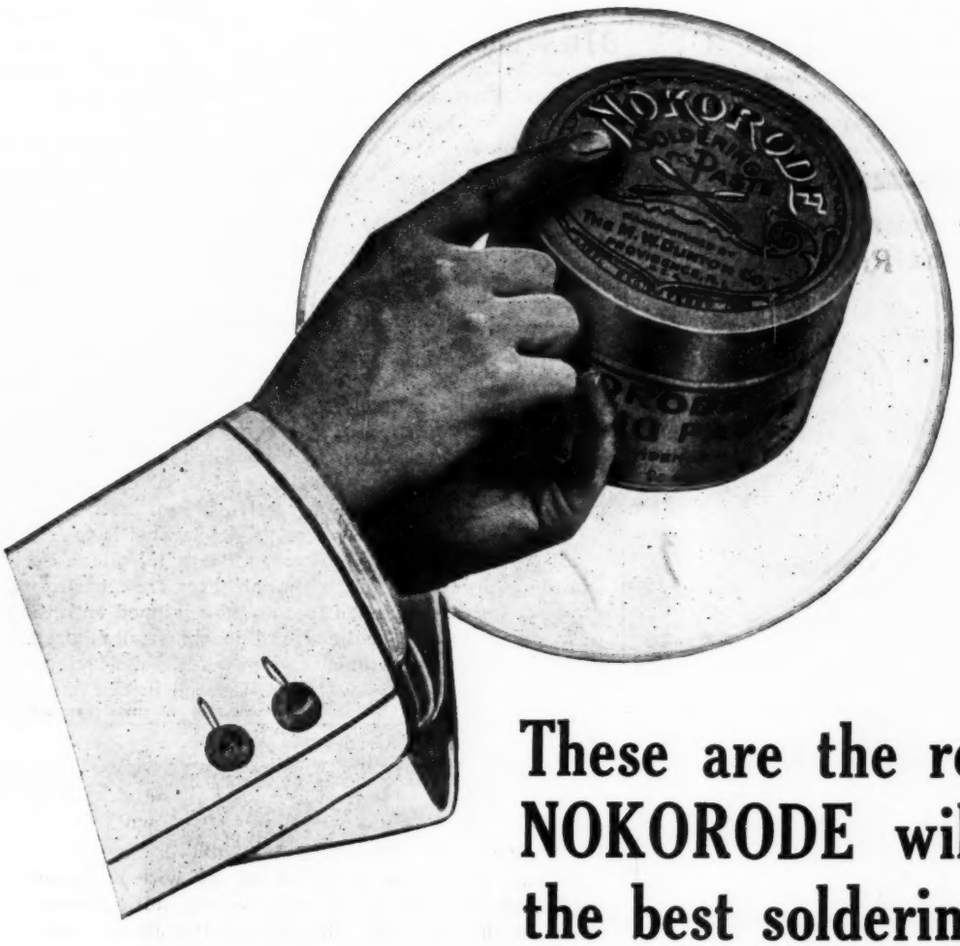
Stromberg-Carlson Advertising Service.

Independent exchange men are not slow to take advantage of business building opportunities offered them. The advertising

A Telephone at Her Bedside
And a slight illness loses most of its unpleasantness. Saves steps for the rest of the family, too.
The cost is very slight.
Our Extension Service Department will gladly give information and full details on request
Home Telephone Company

The Extension Telephone in the Sick Room.

department of the Stromberg-Carlson Telephone Mfg. Co. has prepared a series of newspaper advertisements for the development and up-building of extension telephone service. The accompanying illustrations show the style and arrangement of



These are the reasons why NOKORODE will give you the best soldering results—

To do the same kind or amount of soldering, *less* NOKORODE is required than any other paste:

Flows readily—acts quickly—solders all metals except aluminum;

Makes a smooth, *non-corrosive* joint;

There is *no* kind of soldering job which NOKORODE will not do better;

NOKORODE gives such good satisfaction because it is compounded so thoroughly that even the smallest possible amount contains the same proportionate elements;

Has demonstrated its high efficiency for telephone work on the telephone circuits of the Panama Canal, and for hundreds of Telephone Companies in this and other countries.

If it doesn't make good, money refunded

Manufactured Exclusively by the

M. W. DUNTON COMPANY
150-152 Niagara St.
PROVIDENCE, R. I.

[NOKORODE]

"The Perfect Soldering Paste"

We will pay $1.00 in cash

if you can do anything with a soldering iron—no matter what. Write us giving as good a description as possible; if the suggestion is one which we can publish, *we will pay you $1 in cash.*

Write for a copy of SOLDERING KINKS—"The last word in soldering"—25c per copy

NOKORODE PRICES:

2 oz. cans, less than case lots, each.....25c
2 oz. cans, 3 dozen, (one case), dozen $2.00
1 lb. cans, ½ dozen (one case), lb.....$1.00
10 lb., any quantity, lb. $1.00
25 and 50 lb. cans, lb. 90c

Discounts in case lots 50 per cent.

Discounts in less than case lots, 40c.

copy. It will be noticed that the name of the Stromberg-Carlson company does not appear in the advertisements.

A series has also been prepared showing the use of the No. 10 combination type of extension telephone. These electrotypes are ready for distribution among telephone companies

Do You Run Downstairs When the Telephone Rings?
Have your message come upstairs to you instead. Saves steps—lessens fatigue.
Investigate our Extension Telephone Service. Real telephone convenience—at a cost but a trifle more than you now pay for regular service.
Call our Extension Service Department
Home Telephone Company

Showing the Value of Extension Service in Saving Steps.

and will be forwarded promptly and without charge, upon receipt of a request from such companies. The only obligation is that a copy of the paper in which the advertisement appears be forwarded to the Stromberg-Carlson company.

Extension telephone service is a by-product of every operating company and its development not only broadens its scope of service, but subsequently increases the company's revenue. This advertising service, it is said, is being used by many operating companies with splendid results. Local newspaper

A Midnight Telephone Call
isn't such an annoyance when you have a telephone only a couple of steps from your bed.
And think of the convenience when you are ill—you can handle all important office details personally.
For full information and details just tell Central to give you our Extension Service Department
Home Telephone Company

Another Example of Stromberg-Carlson Advertising Service.

space, as a rule, is not very expensive and this kind of advertising is bound to produce additional business.

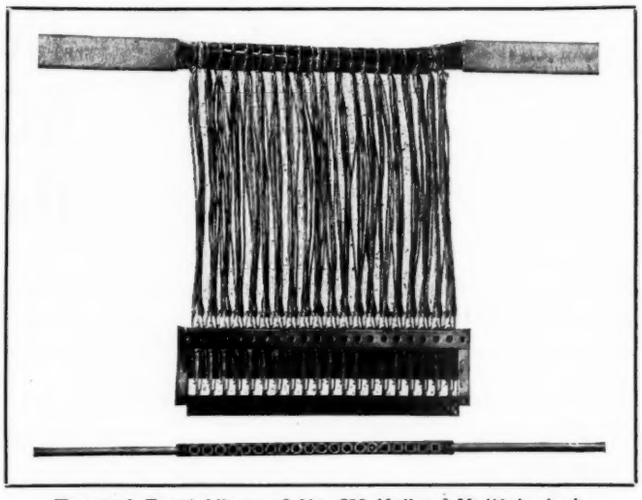
Kellogg Multiple Jacks for New Park Exchange, Toledo, O.

The new Park exchange of the Ohio State Telephone Co., which is being installed at Toledo, Ohio, will be equipped by the Kellogg Switchboard & Supply Co., with No. 239 multiple jacks, which are mounted on ⅜-in. centers. The short multiple and long cables for this work are of special construction. The jacks are ⅜ in. in thickness and the cable is ¼ in. in thickness.

The cable is flat, as will be noticed from the accompanying illustrations, and is made in two sections so that it is possible by combining two cables under one braiding, to obtain the proper dimensions. The difference in the dimension between the thickness of the jacks and the cable is to compensate for the piling of the multiple cable as the height of the multiple increases. Where the short multiple cables join at one strip of jacks, special precaution is taken by making three ties, one at each end and one in the middle of the form. This is to keep the cables in position at this point and to also compensate for the possible sag that occurs when cables are piled one on top of the other with the braid removed.

Cable produced in this form, is an interesting and exceedingly efficient piece of work. The cable is saturated throughout its entire length. An elaborate iron cable rack system is to be installed in conjunction with this exchange, supporting the cables from the switchboard to the various distributing frames and relay rack. When this cable is in place, it presents an attractive appearance.

The Park exchange, where this apparatus is to be placed, will be, it is stated, the largest modern telephone exchange in the United States, for although there are other exchanges larger, there are claimed to be none equipped with the modern arrangements to be found in this switchboard. The culmination of the three past years' rapid development in manual switchboards will be evidenced in this installation.



Top and Front Views of No. 239 Kellogg Multiple Jack.

Everyone in the Kellogg organization is exerting himself to make this the banner job in the history of the Kellogg company.

Paragraphs.

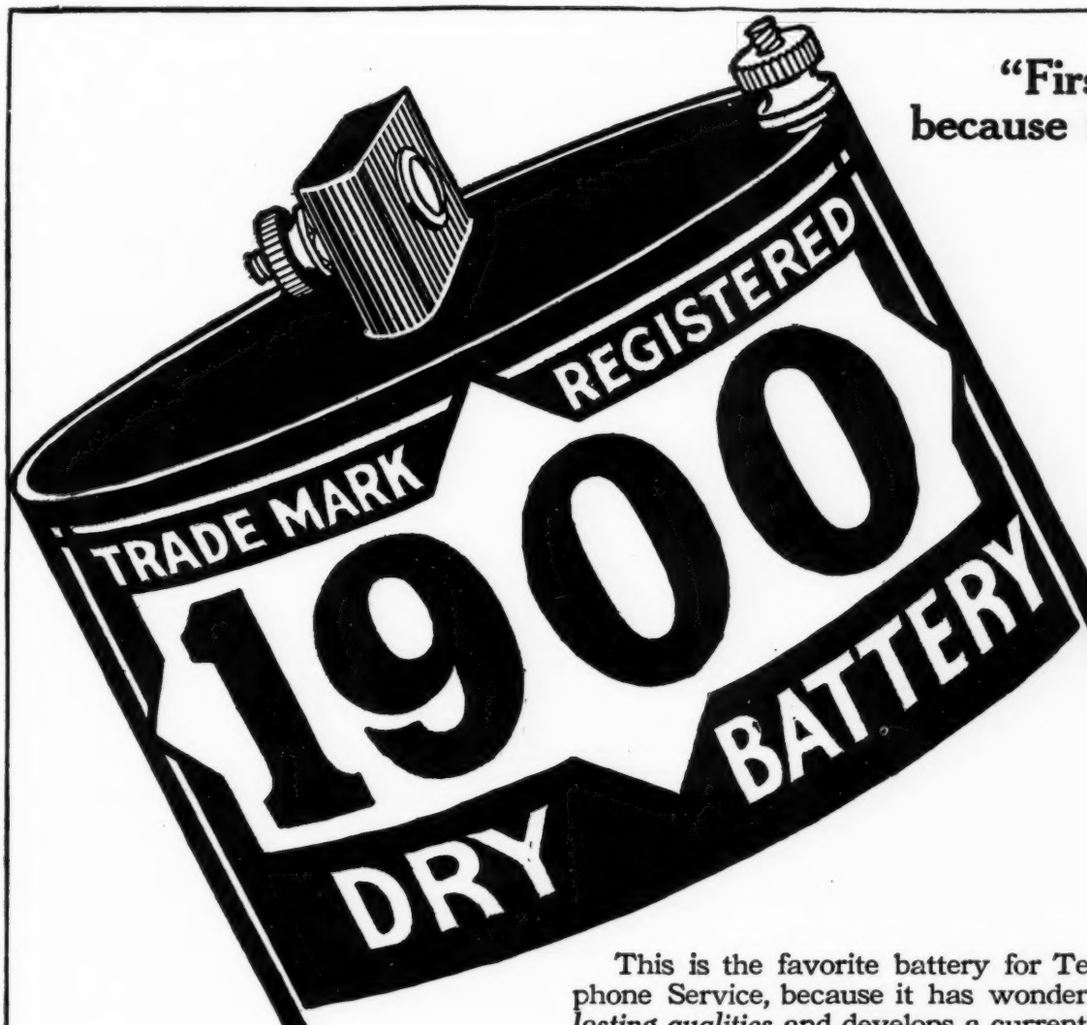
T. J. Cope, Inc., has moved its factory and offices from 3244 North Fifteenth street, to 1620 Chancellor street, Philadelphia, Pa., where it has larger quarters and better facilities for handling its business.

The Scranton Button Co. and Lackawanna Mills, of Scranton, Pa., held their 19th annual outing for their employes at Lake Lodore on Saturday, August 19. Various forms of amusement were provided, including contests, dancing, baseball games, etc.

Results of a Telefault Exchange Offer.

Last April W. N. Matthews & Brother, St. Louis, Mo., offered to take any kind of a fault-finding instrument in exchange for a Matthews Woodpecker Telefault and also make a liberal credit allowance providing the instrument were sent to them with the charges prepaid.

All kinds of instruments were received in response to



"First—
because it lasts"

For
telephone
service

This is the favorite battery for Telephone Service, because it has wonderful *lasting qualities* and develops a current of uniform strength.

The *reliability* of the 1900 Battery has been established by the test of years in thousands of exchanges throughout the country.

Because of its unusual length of life the 1900 is an *economical* battery as well as a trouble-saver.

Ask anybody who has been using it.

NUNGESSER
CARBON & BATTERY WORKS
OF NATIONAL CARBON CO.
CLEVELAND, OHIO

Our booklet, "Sparks of Genius" explains how we put the *extra* service into the 1900 Battery.
Write us for free copy.

Nungesser
Carbon &
Battery Works
of National Carbon Co.
Cleveland, Ohio
Please send me your booklet
"Sparks of Genius"

_____

_____

this offer. About half of them are shown in the accompanying reproduction of a photograph taken at the close of the 30-day period over which the offer extended. The Matthews Woodpecker Telefault which was given in exchange for these instruments is shown in the foreground

Instruments Replaced by Matthews' Woodpecker Telefault.

within the white circle. The other instruments accepted for exchange and not shown in the photograph were knocked down and the wire and brass parts sold for junk.

Grayson Telephone Co. Employes Enjoy Picnic.

A day that will not soon be forgotten by the employes of the Grayson Telephone Co., of Sherman and Denison, Texas, was the occasion of the annual picnic which was held at Woodlake, just half way between the two cities on the evening of August 4.

These two prosperous north Texas cities are located in the same county, just ten miles apart and the telephone exchanges are owned by the same company. Arrangements were made for former operators of the two exchanges, who have married and left the employ of the company, to take charge of the switchboards for the evening, and at 5 o'clock, special interurban cars carrying the employes and their families left the respective cities and at 5:20 met at Woodlake, Grayson county's beauty spot.

The Sherman party was under the care of President H. W. Head and General Manager C. A. Shock with their wives, who with Chief Operator Miss Emma Dickerson and Foreman W. E. Burney and Mrs. Burney laid the plans for the event.

The Denison party were under the guidance of Manager C. B. Sullenberger and Mrs. Sullenberger, assisted by Chief Operator Mrs. Rae Koeger and Foreman W. L. Porter and Mrs. Porter.

Upon the arrival at the lake, President Head distributed bathing tickets among the crowd and for an hour almost every one of those present took advantage of the opportunity to try out the bathing beach recently opened to the public by the Texas Traction Co., and all joined in pronouncing it a grand success.

Following the swim in the lake, a bountiful supper was served in the pavilion and upon making a count it was found that 112 were present. Fried chicken, cake, sandwiches, salads, fruit, cakes, pickles, lemonade, watermelon and ice cream were served in an abundance and quality that would excite the envy of the most fastidious.

At a late hour the picnickers departed for their homes after voting unanimously to make the affair an annual event. The only objection was voiced by President Head, who stated that a year is too far away and that he would much prefer to have it repeated every month.

Condensed News Reports

Officers of Companies Are Urgently Requested to Forward to Us Promptly All Financial and Other Statements as Soon as Issued and Any Items of Interest as to Their Plants and Systems

New Companies and Incorporations.

SUNMAN, IOWA.—The Farmers' Telephone Exchange has been incorporated with $1,000 capital stock. The directors are C. F. Fletcher, E. R. Behlmer and G. W. Trautman.

WOODBINE, IA.—Articles of incorporation changing the name of the Woodbine Telephone Co. to the Boyer Valley Telephon Co., with an authorized capital stock, have been drawn and filed. S. B. Kibler is president, L. W. Kibler, vice president, M. R. Reed, secretary, and S. B. Kibler, treasurer.

WARREN, MICH.—The Warren Rural Telephone Co. has been incorporated with $2,320 capital stock. The incorporators are G. E. Schuster, J. M. Reid and Wm. F. Busch, all on R. F. D. 1.

ALGER, MICH.—The Alger Telephone Co. has been incorporated with $500 capital stock. The incorporators are A. D. Franklin, E. A. Kerr and G. A. Vandervear, all of Alger.

BRAINERD, MINN.—Incorporation papers have been filed by the Long Lake Co-operative Telephone Co., which will operate in Long Lake township. The capital stock is $1,000. The incorporators are Peder Madsen, J. P. Jensen, H. M. Hughey, K. J. Nesheim, Gust Soderman, John Handeland, Emil Paulson, Oscar Thelander and Ludwig Larson. The officers are: president, Peder Madsen; vice-president, J. P. Jensen; secretary, H. M. Hughey, and treasurer, K. J. Nesheim.

SQUARE BUTTE, MONT.—The Square Butte Telephone Co., of Chouteau county, has been incorporated with a capital stock of $2,500. The incorporators are R. E. Champlin, S. T. Wiprud, S. D. McFarland, R. W. Baokie and H. K. Cohen.

REDMOND, ORE.—Articles of incorporation have been filed by the Central Oregon Co-operative Telephone Co. with capital stock of $20,000.

SAYRE, OKLA.—The X. Y. Mutual Telephone Co. of Beckham county has been incorporated with $700 capital stock. The incorporators are C. C. Wisler, Frank Schwer and W. A. Fuller, all of this city.

BURKETOWN, VA.—The Burketown Telephone & Telegraph Co. has been incorporated with a maximum capital stock of $5,000. The incorporators are W. A. Sherman, president, Burketown; G. L. Showalter, vice-president, Weyers Cave; J. W. Wine, secretary and treasurer, Mt. Sidney.

Construction.

SANGER, CAL.—H. F. Knapp, manager of the Sanger Telephone Co., has purchased land upon which a new and strictly modern exchange building will be erected.

CAMBRIDGE, IOWA.—The Story County Telephone Co. has commenced work on its new building.

SELMA, ALA.—The Southern Bell Telephone & Telegraph Co. will erect a new and strictly modern exchange building in this city which will cost about $85,000.

WAYCROSS, GA.—The Southern Bell Telephone & Telegraph Co. is planning to expend between $8,000 and $10,000 in the extension of its cable system in this city.

CALDWELL, IDAHO.—The Mountain States Telephone & Telegraph Co. will spend about $20,000 in improvements and extensions in this city and vicinity.

OAKTOWN, IND.—R. D. Bond, owner of the Oaktown Telephone Co., is installing a new switchboard, which will take care of 1,200 subscribers.

LYONS, KANS.—A new telephone building is to be erected by

Replace All Your WetCells With →

Voltage 9-10
Height 10"—Weight 10 lbs.

It's Correct

in principle; high in quality; right in price. With a set of "Old Masters" you can operate your talking circuit at 1/3 your present yearly expense.

You'll come to it some day, why not investigate at once and begin **immediately** to save money by eliminating costly chemical renewal?

Your request for more information will have our prompt attention.

The Toledo Battery Co.
310 St. Clair St. Toledo, Ohio

Warner Pole Changers

20 Years in Service; Over 20,000 in Daily Operation

The first successful pole changer made.

It revolutionized "ringing conditions" in the telephone field; and set such a high standard then that it has never been equaled.

Economical and reliable, it has stood the test of long service, and is pronounced the one perfect pole changer by the leading telephone men of the country.

Let us solve your ringing problems.

WARNER ELECTRIC CO., Muncie, Ind.

No Guesswork

There is no guesswork in making **Roebling Double Galvanized Telephone Wire.**

Every process of manufacture is conducted with the knowledge which comes from long experience. Metals are carefully selected and quality assured by exacting tests. Drawing is done by men who know how to produce wire of uniform diameter and even temper. The galvanizing is the kind which distinguishes **Roebling** wire, representing, as it does, exclusive processes, developed during more than seventy years of wire manufacture.

John A. Roebling's Sons Company
TRENTON, NEW JERSEY

Veeder Counters

¶ When you desire to take the count of the calls the operator answers, a Veeder Counter is necessary.

¶ Get a counter that can be depended upon at all times. You can make no mistake in selecting the Veeder.

¶ Write for catalogue which gives a complete description.

THE VEEDER MFG. CO.

11 Sargeant St. Hartford, Conn.

Makers of Cyclometers, Odometers, Tachometers, Tachodometers, Counters and Fine Castings.

Obviates the Traffic Obstruction Bogy

Public convenience cannot be infringed by blocked streets, and city officials often hesitate about putting the wires underground on account of the traffic obstruction bogy. The **ease** and **speed** with which

ORANGEBURG FIBRE CONDUIT

can be laid—the narrow trenches needed—do away with the traffic obstruction argument for good and all. **Proven** by experience of other cities. GET THIS DATA, Book H.

THE FIBRE CONDUIT COMPANY

ORANGEBURG, N. Y.

NEW YORK BOSTON CHICAGO SAN FRANCISCO

ARGUS LIGHTNING ARRESTER

Before

Lightning takes its toll, install

Argus Arresters

and you will be glad

After

the storm.

"Quicker Than Lightning"

Foote, Pierson & Company

160-162 Duane Street

New York City

the Missouri & Kansas Telephone Co. in this city. The building will be of stucco.

FLAXTON, N. D.—The Farmers & Merchants Telephone Co. is building about 30 miles of new lines.

BROOKLYN, N. Y.—A building permit has been granted to the New York Telephone Co. for the addition of four stories to its present exchange building on Fourteenth street, South Brooklyn.

PORTLAND, ORE.—The Pacific Telephone & Telegraph Co. will spend about $60,000 in improving its system in this city and immediate vicinity.

GROTON, S. D.—The Groton-Ferney Mutual Telephone Co. is building a new exchange.

MARSHFIELD, WIS.—The Marshfield Telephone Exchange Co. has built a new line near Hewitt, Wis., and is constructing a circuit along the old lines to accommodate 16 new subscribers, between Marshfield and McMillan, requiring four miles of wire.

Elections.

BURR OAK, KANS.—At the annual meeting of stockholders of the Farmers Mutual Telephone Co., held recently, A. G. Mizner was re-elected a member of the board for Burr Oak; D. M. Anderson elected for Northbranch and H. W. Brent for Otego. The company is now in good financial condition, with over $1,600 on deposit.

HOLDEN, MO.—The annual stockholders' meeting of the Holden Home Telephone Co. was held recently. Ten directors were elected, and the new board then organized by electing W. B. Wallace, president; J. W. Adams, vice president; H. J. Scheer, treasurer, and M. L. Golladay, secretary and general manager.

ELGIN, NEB.—The stockholders of the Antelope County Mutual Telephone Co. held their annual meeting recently and re-elected the following directors for another year: W. H. Cratty, C. B. Kinney, J. J. Griffin, E. W. Durham and August Schultz. After the stockholders' meeting, the directors held their meeting and re-elected the old officers who are: W. H. Cratty, president; J. J. Griffin, vice-president, and C. B. Kinney, secretary. Wm. H. Campbell was elected the fiscal agent of the company.

NAZARETH, PA.—At the annual meeting of the Slate Belt Telephone & Telegraph Co. held recently, the following directors were re-elected for the ensuing year: Dr. J. C. Keller, Wind Gap; E. G. Markley, Bangor; Dr. E. S. Rosenberry, Stone Church; M. T. Swartz, Easton; E. A. Speer, Pen Argyl; William H. Milchsack and A. G. Connolly, Nazareth. Mr. Connolly was elected president and general manager, Dr. Keller, vice president, and James A. Grubb, secretary and treasurer.

Financial.

GASTON, IND.—The Gaston Home Telephone Co. has filed notice of an increase in capital stock from $10,000 to $25,000.

HEBRON, ILL.—At a recent meeting of the Farmers' New Era Telephone Co. the directors declared a dividend of 3 per cent. and set aside a reserve fund of $4,000.

MAYSVILLE, KY.—The Maysville Telephone Co. has increased its capital stock from $5,000 to $50,000.

BOSTON, MASS.—Directors of the New England Telephone & Telegraph Co. have voted to issue $7,891,050 new stock. Holders of record August 15 will have the right to subscribe until September 15 to the new shares on the basis of one share of new for each six shares held at $100 a share.

Miscellaneous.

BEARDEN, ARK.—The Bearden Telephone Co. has sold its holdings to the Home Telephone Co., of Fordyce, Ark.

JEWELL, IOWA.—The Jewell Telephone Co., which was incorporated in 1902 with a capital stock of $1,500, has filed a notice of dissolution.

LINCOLN, KAN.—F. W. Herman has sold the Lincoln Telephone Exchange to the United Telephone Co., of Abilene, Kan.

CALDWELL, TEX.—H. C. Robinson, of San Antonio, has purchased the telephone exchanges at Caldwell and Giddings. He will make improvements to the plants.

PARIS, TEX.—The Southwestern Telegraph & Telephone Co. has purchased a site for a new telephone exchange building which it will erect as soon as the plans can be prepared.

MINERAL POINT, WIS.—The Mineral Point Telephone Co. has sold its telephone holdings to E. L. Harmon, of Disko, Ind., and H. L. Larrew, of Akron, Ind. Messrs. Harmon and Larrew have, for several years, operated telephone plants at Disko and Akron, Ind., respectively.